



United States Department of Agriculture

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# **Biennial Monitoring Evaluation Report**

**for the Dixie National Forest 2017-  
2018**



**Forest Service**

**Dixie National Forest**

**April 2020**



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## Summary of Findings and Results

**Table 1. Summary of findings**

<b>Monitoring Item Question</b>	<b>Do monitoring results demonstrate intended progress or trend toward Plan targets?<sup>1</sup></b>	<b>Based on the evaluation of monitoring results, may changes be warranted?</b>	<b>If a change may be warranted, where may the change be needed?<sup>2</sup></b>
<b><i>Recreation and Wilderness</i></b>			
Are developed recreation sites meeting Forest Plan standards for use, and are visitors satisfied?	Yes	Unsure – Management Activities	Management Activities - Unsure if change is warranted at this time. The long interval between NVUM reports prevents rapid reaction to changing conditions
Are developed recreation sites meeting Forest Plan standards for condition?	Yes	No	N/A
Are dispersed recreation sites meeting Forest Plan standards for use, and are visitors satisfied?	Yes	No	N/A
Are dispersed recreation sites meeting Forest Plan standards for condition, and are visitors satisfied?	Yes	No	N/A
Are trails meeting Forest Plan standards for use and condition, and are visitors satisfied?	Yes	No	N/A
Is wilderness character being preserved on wilderness areas across the Forest?	Unsure (C)	Yes – Plan Monitoring Program  Yes – Forest Assessment	Plan Monitoring Program - Change may be warranted based on the 2018 baseline monitoring reports. Each baseline report selected measures to measure trend based on the unique features and management issues for each wilderness. These indicators should be used to measure future trends. Because of the complexity of wilderness management, trend should be determined on an individual wilderness area basis.

<sup>1</sup> Interval of data collection is beyond this reporting cycle (A); or more time/data are needed to understand status or progress of the plan component (B); or methods/results are inadequate to answer monitoring question (C).

<sup>2</sup> See body of the report for more details regarding any specific recommendations/opportunities for change.

			Forest Assessment - Change may be warranted. Change should be made to the monitoring indicators and methodology to reflect the Dixie's wilderness baseline monitoring reports for each of the four wilderness areas on the Dixie.
<b>Cultural Resources</b>			
Are heritage resources being protected and are mitigation measures sufficient to prevent damage to heritage resources from federal actions, looting, environmental disturbance, and other actions?	Yes	No	N/A
<b>Fish and Wildlife</b>			
Is the diversity of wildlife habitat being maintained by managing Vegetative Structural Stage (VSS) distribution across the planning area?	Yes	No	N/A
Are forest management activities and/or natural events affecting the structure and function of upland and riparian ecosystems?	Yes	No	N/A
Is big game habitat maintained to meet Forest Plan desired conditions?	Yes	No	N/A
Are forest management activities and natural events affecting the ecological conditions indicated by the status of focal species <sup>3</sup> ?	Unsure (B)	Uncertain – Forest Plan Yes – Management Activities	Forest Plan - Of the quantitative fish focal species monitoring sites sampled in FY2017 and FY2018 65% showed a more than 20% decline in standing crop or had no focal species remaining. Natural events and forest management activities may be affecting fish focal species at these monitoring sites. 60% of these sites with a decline are known to have had flooding, ash flow and or debris flow impacts related to wildfire within the past 10 years. All but one of the remaining sites are within the realm of variability displayed in past sampling efforts and declines are probably attributable to natural runoff and temperature variability combined with fish passage obstructions. Declines in North Fork Pinto Creek could also be related to forest management activities (recreation,

<sup>3</sup> Bonneville Cutthroat trout (BCT), Colorado River Cutthroat Trout (CRCT), Southern Leatherside, Chub, Virgin spinedace and Nonnative trout species.



			<p>roads, and livestock management). Further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them. Refer to the Forest Fish Biologist to assess the direction of change and evaluate if there is mitigation that will improve them, if needed. Continue to monitor focal species, by district, annually. If this process fails to improve sites over time, a change in Forest Plan may be warranted.</p> <p>Management Activities - Post-fire flooding, ash flows and debris flows from the 2018 West Valley Fire, 2017 Brian Head Fire, 2017 North Fire and 2012 Shingle Fire had negative impacts on standing crop and occupied habitat of the following fish focal species: Bonneville cutthroat trout, Southern leatherside chub, and nonnative trout. For the most part UDWR and Forest restoration efforts have offset the loss of occupied habitat for Bonneville cutthroat trout. Declines in North Fork Pinto Creek may be related to forest management activities (recreation, roads, livestock management). Further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them. This should be done for each monitoring area where monitoring showed a greater than 20% decline in standing crop or no focal species remaining. Continue to cooperate with UDWR to monitor fish focal species population structure and occupied habitat and report annually. Work to plan vegetation and fuel reduction treatments in watersheds with high priority focal species populations to reduce the risk of uncharacteristically large and severe wildfires. Continue to work with UDWR to fulfill Regional obligations for focal species conservation contained in Conservation Agreements and Strategies, as well as other jointly developed management plans.</p>
Are management activities maintaining and improving the ability of lakes and streams on the Forest to maintain self-sustaining cold water fisheries?	Unsure (C)	Uncertain – Forest Plan Yes – Management Activities	<p>Management Activities - Further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them. This should be done for each monitoring area where monitoring showed a greater than 20% decline in standing crop or no focal species remaining. Continue to cooperate with UDWR to monitor fish focal species population structure and occupied habitat and report annually. Work to plan vegetation and fuel reduction treatments in watersheds with high priority focal species populations to</p>

			<p>reduce the risk of uncharacteristically large and severe wildfires. Continue to work with UDWR to fulfill Regional obligations for focal species conservation contained in Conservation Agreements and Strategies. Long-term continuous temperature monitoring at baseline and managed sites is needed to determine the role of management activities versus climate in patterns of increasing water temperature. Forest Plan - Further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them. Refer to the Forest Fish Biologist to assess the direction of change and evaluate if there is mitigation that will improve them, if needed. Continue to monitor focal species and water temperature, by district, annually. If this process fails to improve sites over time, a change in Forest Plan may be warranted.</p>
<p>Are forest management activities and/or natural events maintaining aquatic habitat to meet Forest Plan desired conditions and objectives or improving habitat to move toward those conditions and objectives?</p>	<p>Unsure (B)</p>	<p>Yes – Management Activities</p> <p>Uncertain – Forest Plan</p>	<p>Management Activities - According to vegetative data collected by the Forest Botanist 39% of riparian sites monitored are not meeting or moving toward desired conditions and objectives for aquatic habitat as set forth in the Dixie Forest Plan. Further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them. This should be done for each monitoring area where monitoring showed a greater than 20% decline in standing crop or no focal species remaining, bank stability or bank cover lower than Forest Plan or BASI objectives, increased GGW, below or trending from Forest riparian vegetation objectives, water temperatures that exceeded State Beneficial Use Criteria. Continue to cooperate with internal and external partners to monitor fish focal species population structure and occupied habitat, partial MIM long-term habitat indicators, continuous water temperature, and riparian vegetation and report annually. Work to plan vegetation and fuel reduction treatments in watersheds with high priority focal species populations to reduce the risk of uncharacteristically large and severe wildfires. Continue to work with UDWR to fulfill Regional obligations for focal species conservation contained in Conservation Agreements and Strategies. Work to identify areas where grazing management needs changed based on long-term vegetation data, habitat data and annual use data. Refer to the Forest Fisheries Biologist to assess the direction of change and evaluate if there is</p>

			<p>mitigation that will improve them, if needed. Continue to monitor aquatic habitat and report, by district, annually. If this process fails to improve sites over time, a change in Forest Plan may be warranted.</p> <p>Forest Plan - Further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them. Annual use data should be collected and compared to the results of riparian vegetation and partial MIM long-term indicators, especially at sites where long-term indicators are below Forest Plan or BAS objectives, to determine what role livestock management is playing in the condition of these sites. Refer to the Forest Fish Biologist to assess the direction of change and evaluate if there is mitigation that will improve them, if needed. Continue to monitor focal species, by district, annually. If this process fails to improve sites over time, a change in Forest Plan may be warranted.</p>
Are TES plant habitats being protected from forest plan implementation activities and maintaining sufficient numbers and distribution to maintain viable populations across the Forest?	Unsure (B)	Yes – Management Activities Uncertain – Forest Plan	<p>Management Activities – Road maintenance in TES plant areas. Annual road maintenance destroyed a few TES plants at one of the monitoring locations that was adjacent to a road. This management activity caused a decline in plant numbers on this monitoring site.</p> <p>Forest Plan - Much of this data was collected between 2017 and 2018 field seasons. This is not a large enough time frame to properly assess variability in numbers and trend. Refer to the Forest Botanist to assess the sufficiency of TES plant numbers, distribution, and viability and evaluate if there is mitigation that will improve them. Continue to monitor TES plant habitats for population trend, distribution, and viability and report, via the Forest monitoring report, every two years. If this process fails to maintain or improve these plant populations over time, a change in Forest Plan may be warranted.</p>
Are forest management activities and natural events affecting the ecological conditions indicated by the status of focal species <sup>4</sup> ?	Yes	No	N/A
Are TES animal habitats being protected from	Unsure (B)	Uncertain – Forest Plan	Forest Plan - Direct mortality and habitat degradation from post-wildfire flooding,

<sup>4</sup> Mule deer, rocky mountain elk, wild turkey, Northern goshawk, Northern flicker, and sage-grouse, pygmy rabbit, spotted bat, Townsends Wester big-eared bat, bald eagle, sage-grouse, peregrine falcon, Flammulated owl, and three-toed woodpecker.

forest plan implementation activities and maintaining sufficient numbers and distribution to maintain viable populations across the Forest?		Uncertain – Management Activities	<p>ash flows and debris flows continue to impact Sensitive fish populations on the Forest and were responsible for the combined loss of 31.1 km (19.3 miles) of occupied BCT habitat in 2017-2018 alone. Since boreal toad began to be monitored in the 1990s only two breeding areas have been identified on Boulder Mountain, with the most recent being documented for the first time in 2011. Populations on the Boulder have always seemed to be low in numbers and had sporadic breeding success. In the early 2000s boreal toad populations dropped precipitously on the Paunsaugunt Plateau. The population has tested positive for chytrid fungus (<i>Batrachochytrium dendrobatidis</i>) which has caused reduced survival and population declines in other boreal toad populations within the Intermountain West. In addition to infection by chytrid fungus boreal toad breeding habitat on the Paunsaugunt Plateau began to decline in the 2000s. The decline in numbers of toad and number of breeding areas is a probable result of the combination of these two factors. Multiple use activities such as prescribed fire, timber harvest, roads, and livestock management can also have impacts to boreal toad and their habitats and are present adjacent to both the Boulder Mountain and Paunsaugunt Plateau populations</p> <p>Further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them. Refer to the Forest Fish Biologist to assess the direction of change and evaluate if there is mitigation that will improve them, if needed. Continue to monitor Sensitive species, by district, annually. If this process fails to improve sites over time, a change in Forest Plan may be warranted.</p>
Is the spatial arrangement of snags in condition to meet needs of cavity nesters?	Yes	No	N/A
Are known goshawk territories on NFS lands remaining occupied?	No	Yes – Forest Plan Yes – Forest Assessment	Forest Plan - Goshawk populations are below MVP. Goshawk population trends are down in Utah, across the Intermountain region, and across all survey areas. These trends are a reflection of goshawk population numbers across the Dixie NF. Suggested change would be to evaluate goshawk territory occupancy on the Forest in relation to regional goshawk population levels.

			Forest Assessment - Monitoring assessment does not account for factors influencing regional population levels beyond management control on the Forest. Compare Forest level population level relative to regional population levels.
Are goshawk territories remaining occupied following vegetation management?	Unsure (C)	Uncertain – Forest Plan	Forest Plan - Goshawk population trends are down in Utah, across the Intermountain region, and across all survey areas. These trends are a reflection of goshawk population numbers across the Dixie NF and may not be a response to management treatments. Monitoring assessment does not account for factors influencing regional population levels beyond management control on the Forest. Compare Forest level population level relative to regional population levels.
Is mature and old forest habitat connectivity being adequately maintained?	Yes	No	N/A
Is downed wood being maintained in sufficient amount, size, and location?	Yes	No	N/A
Are appropriate adjustments to grazing practices being made where grazing is contributing to at-risk conditions?	Yes	No	N/A
<b>Range</b>			
Are goods and services being provided in accordance with Forest Plan goals and objectives?	Yes	No	N/A
Are desired conditions for rangeland plant communities being met in regards to species composition, trend and ground cover?	Unsure (B)	Yes – Management Activities	Management Activities – On 35% of the sites monitored, desired conditions for rangeland plant communities are not being met. Further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them. Monitoring areas not meeting desired condition for rangeland plant communities are sent to the appropriate District rangeland management specialist to be evaluated. If the range specialist determines that these areas are able to be improved through permit action, then an adjustment in the AOI's for each site affected should be made. Continue to monitor rangeland plant communities and report, by district,

			annually. If this process fails to improve sites over time, a change in Forest Plan may be warranted.
What is the extent of the change of ecological conditions due to invasive species?	Yes	Unsure – Management Activities	Management Activities – The monitoring systems are adequate, but the lack of funding makes the noxious weed monitoring and treatment less effective.
<b>Timber</b>			
Are vegetation conditions stable or moving toward Forest Plan desired conditions?	Yes	No	N/A
<b>Soil and Water</b>			
Are beneficial uses, identified by the state of Utah, being maintained for all water bodies?	Yes	No	N/A
Are forest management activities affecting stream channels and riparian ecosystems?	Unsure (A, B)	Yes – Forest Plan Yes – Management Activities Yes – Plan Monitoring Program	Forest Plan - 26% of the Level III riparian inventory sites indicate a slightly downward or downward trend in vegetative successional status, bank stability, and/or effective ground cover. Further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them. Refer to the Forest Hydrologist to assess the direction of change and evaluate if there is mitigation that will improve them, if needed. Continue to monitor stream channels and riparian ecosystems and report, by district, annually. If this process fails to improve sites over time, a change in Forest Plan may be warranted.  Management Activities – For GDEs and timber harvest ground based skidding and harvesting activities are impacting groundwater dependent ecosystems (GDE) undesirably. Most of this is due to a lack of identifying and protecting these features on the ground during implementation.  Plan Monitoring Program – For GDEs and timber harvest data collected for impacts to GDEs was from one sale area and more data is needed from other harvest activities across the forest to better answer this question. Methods for the next cycle should include more GDEs within a sale area and for multiple sale areas.
Are appropriate BMPs being followed with forest management activities and are they meeting their intended effectiveness	No	Yes	Management Activities: Grazing, Ground Based Skidding and Harvesting, and Mechanical Site Treatments (without skidding) failed some aspect of BMP compliance and effectiveness for 83, 60,

with respect to impacts to riparian ecosystems?			and 33 percent of the activities monitored, respectively. Other categories of activities do not have a sufficient number that have been monitored to make conclusions.
Are forest management activities impairing soil productivity of the land?	Unsure (C)	Yes	Monitoring Program - Methods should also include appropriate protocols for assessing rangelands. More data and types of activities need to be monitored in order to answer this question. At least 4 activities per year should be monitored with half of them being in rangelands and the other half in timbered areas.
<b>Facilities</b>			
Is adequate road access and maintenance being provided?	Yes	No	N/A
Are open roads maintained to standard?	Yes	No	N/A
Do potable and non-potable water systems meet Federal, State, and Local requirements?	Yes	No	N/A
Do dams on Forest Service lands meet State and Local safety requirements?	Yes	No	N/A
<b>Protection</b>			
Are fuel treatment projects reducing risk to property, human health and safety, and reducing the potential for unwanted fire effects through reduction of total fuel loading to manageable levels?	Yes	No	N/A
Are forest vegetation conditions trending towards safe and efficient fire response and restoring fire as a disturbance agent consistent with management area emphasis and historic fire return intervals?	Yes	No	N/A
Are forest vegetation conditions stable or moving toward Forest Plan desired conditions?	Yes	No	N/A
<b>Education</b>			

Education and information: Are we delivering key education/enforcement messages to forest employees and users? (Key focus areas are: OHV use, recreation user ethics, fire's role/hazardous fuels, noxious weeds, watershed health.)	Yes	No	N/A
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## Introduction

### Purpose

The purpose of the biennial monitoring evaluation report is to help the responsible official determine whether a change is needed in forest plan direction, such as plan components or other plan content that guide management of resources in the plan area. The biennial monitoring evaluation report represents one part of the Forest Service's overall monitoring program for this national forest unit. The biennial monitoring evaluation report is not a decision document—it evaluates monitoring questions and indicators presented in the Plan Monitoring Program chapter of the forest plan, in relation to management actions carried out in the plan area.

Monitoring and evaluation are continuous learning tools that form the backbone of adaptive management. For this reason, we will produce an evaluation report every two years. This is our first written report of this evaluation since the Dixie National Forest monitoring plan was transitioned to the 2012 planning rule. This report indicates whether a change to the forest plan, management activities, monitoring program or forest assessment may be needed based on the new information.

### Objectives

There are several objectives for this report, including:

- Assess the current condition (i.e., status) and trend of selected forest resources.
- Document implementation of the Plan monitoring Program including changed conditions or status of key characteristics used to assess accomplishments and progress toward achievement of the selected Land and Resource Management Plan components.
- Evaluate relevant assumptions, changed conditions, management effectiveness, and progress towards achieving the selected desired conditions, objectives, and goals described in the Forest Plan
- Document any scheduled monitoring actions that have not been completed and the reasons and rationale why it has not.
- Present any new information not outlined in the current plan monitoring program that is relevant to the evaluation of the selected monitoring questions.
- Present recommended change opportunities to the responsible official.



## How to Use this Report

This report is a tool and a resource for the Forest Service to assess the condition of forest resources in relation to Forest Plan direction and management actions. It is also a tool and a resource for the public to learn more about how the Forest Service is managing forest resources. The Dixie National Forest will use this report to inform responsible officials of the status of key desired conditions as well as the effects and effectiveness of plan implementation. New information on resource status, threats, technology and methodologies may indicate needed changes or refinement of the plan monitoring program.

The biennial monitoring evaluation report is designed to help the public, as well as Federal, State, local government, and Tribal entities anticipate key steps in the overall monitoring program. These steps include upcoming opportunities for public participation and how the public will be informed of those opportunities, and how public input will be used as the monitoring program progresses. The biennial monitoring evaluation report is also intended to help people better understand reported results in relation to past monitoring reports, future monitoring reports and the broader-scale monitoring strategy that is issued at the Forest Service Regional level.

## The Importance of Public Participation

We informed the public of the availability of the 2017-2018 biennial monitoring report for the Dixie National Forest on the Forest's web page on April 22 2020, through posting the notice of its completion on the internet on the Dixie National Forest web page.

The Dixie NF is committed to adaptive management and recognizes that the public plays an important role in keeping the monitoring plan relevant. We will consider all substantive comments received through email and letters and welcome an open and engaged dialogue and participation about our Forest Plan monitoring program.

## Roles and Responsibilities

The Forest Plan Monitoring Program requires a coordinated effort of many people, from the people who collect the data, to the people outside the Forest Service who provide feedback and assistance, to the decision maker.

### Responsible Official

Angelita Bullets, Forest Supervisor

435-865-3701

This report will be provided electronically through email to the Forest Supervisor for making decisions about any changes needed or not.

### Plan Monitoring Coordinator

Rich Jaros

Ecosystem Group Staff Officer

435-865-3722

## How Our Plan Monitoring Program Works

Monitoring and evaluation requirements have been established through the National Forest Management Act (NFMA) at 36 CFR 219. Additional direction is provided by the Forest Service in Chapter 30 – Monitoring – of the Land Management Handbook (FSH 1909.12).

The Dixie National Forest monitoring program was updated in *March*, 2017 for consistency with the 2012 planning regulations [36 CFR 219.12 (c)(1)]. The Dixie National Forest Plan was administratively changed to include the updated monitoring program (Chapter 5). For a copy of the current monitoring program go to [Modification of Monitoring Plan](#). Monitoring questions and indicators were selected to inform the management of resources on the plan area and not every plan component was determined necessary to track [36 CFR 219.12(a)(2)]. See the [Administrative Changes to Forest Plan Monitoring Program](#) for discussion on how the monitoring questions were selected to be consistent with the 2012 planning regulations 36 CFR 219.12.

The monitoring evaluation implementation guide (monitoring guide) is part of the overall plan monitoring program and provides more specific direction for implementing the more strategic plan monitoring program and details monitoring methods, protocols, and roles and responsibilities. The Monitoring Guide is not part of the plan decision and is subject to change as new science and methods emerge. The Dixie National Forest monitoring guide is available at [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/fseprd717003.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd717003.pdf)

Providing timely, accurate monitoring information to the responsible official and the public is a key requirement of the plan monitoring program. This 2017-2018 biennial monitoring evaluation report for the Dixie National Forest is the vehicle for disseminating this information.

In the context of forest planning there are three main monitoring goals:

- Are we implementing the Forest Plan as intended? Are we meeting our management targets and project guidelines? (implementation monitoring)
- Are we achieving our Forest Plan management goals and desired outcomes? (effectiveness monitoring)
- Does our hypothesis testing indicate we may need to change the Forest Plan? (validation monitoring)

Implementation monitoring is important for tracking progress and accomplishments. However, it is effectiveness and validation monitoring that drive and support the adaptive management process. Effectiveness monitoring evaluates condition and trend relative to desired conditions. Validation monitoring tests hypotheses and provides information that might necessitate changes to desired conditions in the plan (e.g. is what we think the desired state should be really accurate?).

# Monitoring Evaluation

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## Monitoring Activities

This monitoring report includes a combination of effectiveness and implementation monitoring. It is organized by 9 program areas. Each program area has monitoring questions pertaining to that program and both the questions and results are described below.

The following sections present the most current information (data and evaluations) for all monitoring questions contained within the Dixie National Forest Plan.

This section and all of its subsections (including Appendix B, Monitoring Matrix for the Dixie Forest Plan) describes the details of how monitoring data were collected, reported, and evaluated for the Plan Monitoring Program to support the recommendation options. This section displays the summary of data results compiled for each monitoring item. The organization of this section follows the organization of the monitoring program contained within the Land and Resource Management Plan

Each monitoring item includes 1) a summary of the monitoring question and its indicator(s); 2) an evaluation of the monitoring results; and 3) an adaptive management finding on whether recommendation options could be considered for future changes or not.

## Monitoring Item 1 Recreation and Wilderness

Recreation is a critical monitoring component on the Dixie National Forest. Recreation opportunities on the Dixie National Forest are varied and diverse, including scenic driving, equestrian use, hiking, backpacking, trail riding (motorized and non-motorized), camping, fishing, climbing, canyoneering, etc. By far, the majority of use by the public on the forest is recreation related, both developed and dispersed. Conditions of recreation facilities and the forest's ability to maintain those facilities have a significant influence the public's perception and opinion of the Forest Service. Monitoring those conditions and the public's satisfaction with forest infrastructure are critical in determining the recreation program's priorities given its limited resources.

There are four designated Wilderness areas on the Dixie National Forest: Cottonwood Forest, Pine Valley, Ashdown Gorge, and Box Death Hollow. Wilderness character provides many benefits to forest resources and its users. For the public, it provides unique opportunities, including solitude and unconfined recreation. Wilderness also offers protection and preservation of critical watersheds, water quality, wildlife habitat, endemic species, etc. Monitoring wilderness character can assess the health and condition of wilderness areas and public satisfaction with their experience with wilderness.

**Table 2 - Summary of Monitoring Question and Indicator(s)**

<b>Monitoring Question</b>	<b>Monitoring Indicator(s)</b>
Are developed recreation sites meeting Forest Plan standards for use, and are visitors satisfied?	Developed site use and visitor satisfaction.
Are developed recreation sites meeting Forest Plan standards for condition?	Developed site condition.
Are dispersed recreation sites meeting Forest Plan standards for use, and are visitors satisfied?	Dispersed site use and visitor satisfaction.
Are dispersed recreation sites meeting Forest Plan standards for condition, and are visitors satisfied?	Dispersed site condition.
Are trails meeting Forest Plan standards for use and condition, and are visitors satisfied?	Trail use, and visitor satisfaction; miles of motorized trail managed to standard; miles of non-motorized trail managed to standard.
Is wilderness character being preserved on wilderness areas across the Forest?	Incursions of developed facilities, access, services and perception of safety. Wilderness campsite condition. Motorized/mechanized incursions. Managed wildland/prescribed fire usage.

## New Science or Other Information

No new science or information collected outside of this monitoring program was considered in the evaluation of this monitoring item.

## Monitoring Discussion and Findings

### *1. Are developed recreation sites meeting Forest Plan standards for use, and are visitors satisfied?*

According to the latest National Visitor Use Monitoring reports (2009 and 2014), there is a trend upward for visitor satisfaction with developed recreation facilities: 88.5% satisfaction in 2009 versus 98.7% satisfaction in 2014. Although NVUM did not occur during 2017 and 2018 it is likely that natural disasters and weather events may have had a negative influence on monitoring results in 2019. These include but are not limited to wildland fires and weather events. For example, the Brian Head Fire destroyed Yankee Meadow Campground.

### *2. Are developed recreation sites meeting Forest Plan standards for condition?*

According to data from INFRA from 2011-2019, developed sites on the Dixie are being administered to standard.

### *3. Are dispersed recreation sites meeting Forest Plan standards for use, and are visitors satisfied?*

According to the latest National Visitor Use Monitoring reports (2009 and 2014), there is a trend upward for visitor satisfaction with dispersed recreation: 81.7% satisfaction in 2009 versus 94.7% satisfaction in 2014.

### *4. Are dispersed recreation sites meeting Forest Plan standards for condition, and are visitors satisfied?*

According to data from INFRA from 2011-2019, dispersed sites on the Dixie are being administered to standard. However, it should be noted that monitoring results have yet to capture the influence of wildland fire on dispersed recreation sites such as Yankee Meadow dispersed camping area, which is currently closed due to the Brian Head Fire.

**5. *Are trails meeting Forest Plan standards for use and condition, and are visitors satisfied?***

According to data from National Visitor Use Monitoring reports from 2009 and 2014, public satisfaction increased in developed, undeveloped, and wilderness site conditions. Also, according data in INFRA, trails across the forest continue to be managed to standard.

**6. *Is wilderness character being preserved on wilderness areas across the Forest?***

In 2018 the West Valley Fire occurred in the Pine Valley Wilderness area. Wildfire can both positively and negatively influence wilderness character. Wildfire is a natural process when within the normal range of frequency and intensity, can be beneficial to ecological systems. However, when wildfire is outside the normal range of variability because of suppression or other management activities, it can cause detrimental effects to wilderness character. Wildfire management activities can also have negative effects to wilderness character, such as motorized/mechanized incursions. Increase visitation and recreation activities in popular wilderness areas, such as canyoneering in Cottonwood Forest or hiking in Ashdown Gorge, can deteriorate wilderness character because of its effect on solitude. However a trend determination must be made if these activities are having a negative impact on wilderness character.

Monitoring for the indicators that address this question is unable to fully answer this question. Baseline monitoring reports were recently completed in 2018 and can serve as the foundation for future trend determinations.

## **Adaptive Management Considerations**

Developed Rec sites - Unsure if change is warranted at this time. The long interval between NVUM reports prevents rapid reaction to changing conditions

Although the monitoring question for wilderness character is appropriate, i.e. is wilderness character being preserved on wilderness areas across the forest, trying to select indicators and methods that can be applied universally to all four designated wilderness areas on the Dixie is problematic. Each of the four wilderness areas on the forest are unique in their management issues. For example, though Ashdown Gorge contains several campsites, Box Death Hollow has no known campsites, making measuring trend difficult. Also indicators such as number of motorized/mechanized incursions and fire usage do not measure trend but rather state what is occurring on the ground. Baseline monitoring reports were completed for each wilderness area in 2018, providing much needed synthesis of existing data. Because they provide a baseline, the reports made no determination on trend.

Regarding wilderness character, a change may be warranted for the Plan Monitoring Program based on the 2018 baseline monitoring reports. Each baseline report selected measures to measure trend based on the unique features and management issues for each wilderness. These indicators should be used to measure future trends. Because of the complexity of wilderness management, trend for wilderness character should be determined on an individual wilderness area basis. Also, a change may be

warranted for the Forest Assessment. Change should be made to the monitoring indicators and methodology to reflect the Dixie's wilderness baseline monitoring reports for each of the four wilderness areas on the Dixie.

## Monitoring Item 2 Cultural Resources

The Dixie National Forest is home to an abundant amount of cultural resources which span human history over the past 10,000 years. These are irreplaceable resources that have significant value to Native American Tribes, religious and cultural groups as well as the scientific community. Although laws and regulations require agencies to evaluate the potential effect of an undertaking on historic properties, regular monitoring is necessary to identify and mitigate changes to cultural resources so efforts can be made to preserve and protect those resources. In addition, the Heritage Program is tasked with identifying and monitoring Priority Heritage Areas as an integral part of managing the program to standard.

**Table 3 - Summary of Monitoring Question and Indicator(s)**

Monitoring Question	Monitoring Indicator(s)
Are heritage resources being protected and are mitigation measures sufficient to prevent damage to heritage resources from federal actions, looting, environmental disturbance, and other actions?	Number of historic properties recorded and evaluated for the National Register. Number of eligible historic properties being impacted by federal actions, looting, environmental disturbance, and other actions.

## New Science or Other Information

No new science or information collected outside of this monitoring program was considered in the evaluation of this monitoring item.

## Monitoring Discussion and Findings

- 1. Are heritage resources being protected and are mitigation measures sufficient to prevent damage to heritage resources from federal actions, looting, environmental disturbance, and other actions?*

Monitoring data indicates the amount of heritage resources identified and analyzed are consistent with previous years. In addition, monitoring of sites post project implementation is adequate to determine negative change to those resources. Additionally execution of a statewide Memorandum of Understanding (MOU) between the USFS and the Utah SHPO will positively affect monitoring results since the MOU will allow for a consistent approach to the management of cultural resources and facilitate a well-defined Section 106 process.

## Adaptive Management Considerations

No adaptive management considerations are recommended for heritage resources at this time.

## Monitoring Item 3 – Wildlife

Fish and wildlife are a critical monitoring component for the Dixie NF. Whether viewed as a renewable resource such as hunting and fishing, wildlife viewing, or simply the intrinsic value of enjoying public lands knowing wildlife are protected, preserved, and present; wildlife adds economically to local communities. Proposed management actions to improve forest health or mitigate effects of wildland fire are developed in accordance with fish and wildlife needs. Efforts are underway on the Forest to restore populations of native cutthroat trout and improve conditions for boreal toads. Water developments are constructed for wildlife.

Fish and wildlife monitoring targets focal species and related habitat and is a reflection of multiple components. Critical elements include maintaining species diversity, protecting ecological integrity, and providing or enhancing habitat conditions. During project development Forest Plan standards and guidelines are followed to maintain desired conditions for big game hiding cover, habitat for prey species through retention of coarse woody debris levels, and avoidance of soil disturbance around sensitive plant species. In addition to annual plan monitoring, proposed project actions further drive species monitoring at the project level. For example, known goshawk territories are monitored annually for population level trends on the Forest. At the project level, goshawk surveys are conducted prior to implementation. Proposed timber treatments are designed to improve VSS diversity. Management actions are implemented to avoid erosional impacts to streams and riparian corridors. Utah Division of Wildlife Resources Big Game Trend studies are reviewed to assess habitat conditions.

The good news is big game populations are approaching or surpassing state wildlife official's expectations on the Forest. With careful observation, Bald and Golden eagles can be seen year round. Successful trout fishing can be enjoyed in numerous ponds and streams. Forest biologists assisting State wildlife biologists have successfully established breeding colonies on the Forest for the Utah prairie dog which has recently been down listed from endangered to threatened. Several ongoing efforts to restore and protect native cutthroat trout habitat and populations are ongoing across the Forest. Restoration efforts have occurred on all four districts. Boreal toads, a regionally sensitive species with only two known breeding locations on the Forest, reared from captive bread populations have been released. Boreal toad habitat improvement projects are also under construction.



**Table 4 - Summary of Monitoring Question, Indicator(s), and Methods**

Monitoring Question	Monitoring Indicator(s)
Is the diversity of wildlife habitat being maintained by managing Vegetative Structural Stage (VSS) distribution across the planning area?	Diversity and stability of forest vegetational structural stages (VSS) at the planning area and landscape level.
Are forest management activities and/or natural events affecting the structure and function of upland and riparian ecosystems?	Structure (VSS) and function of forest and riparian ecosystems.  Upland and riparian vegetation diversity, condition, trend, structure and ground cover.
Is big game habitat maintained to meet Forest Plan desired conditions?	Big game habitat condition and/or VSS Distribution across the landscape and within projects.
Are forest management activities and natural events affecting the ecological conditions indicated by the status of focal species <sup>5</sup> ?	Occupied habitat and population structure of focal species.
Are management activities maintaining and improving the ability of lakes and streams on the Forest to maintain self-sustaining cold water fisheries?	Riparian vegetation diversity, condition, trend, structure and ground cover. Stream channel condition, morphology, bank stability and substrate composition. Compliance with State water quality sediment, turbidity and temperature standards and maintenance of beneficial uses. Function and condition of lentic riparian areas.
Are forest management activities and/or natural events maintaining aquatic habitat to meet Forest Plan desired conditions and objectives or improving habitat to move toward those conditions and objectives?	Riparian vegetation diversity, condition, trend, structure and ground cover. Stream channel condition, morphology, bank stability and substrate composition. Compliance with State water quality sediment, turbidity and temperature standards and maintenance of beneficial uses. Function and condition of lentic riparian areas.
Are TES plant habitats being protected from forest plan implementation activities and maintaining sufficient numbers and distribution to maintain viable populations across the Forest?	TES species have suitable habitat to sustain population numbers to maintain viability.
Are forest management activities and natural events affecting the ecological conditions indicated by the status of focal species <sup>6</sup> ?	Habitat conditions retained across the planning area in sufficient numbers and distribution to maintain species viability.
Are TES animal habitats being protected from forest plan implementation activities and maintaining sufficient numbers and distribution to maintain viable populations across the Forest?	TES species have suitable habitat to sustain population numbers to maintain viability.
Is the spatial arrangement of snags in condition to meet needs of cavity nesters?	Snag species, density, size, height and condition.
Are known goshawk territories on NFS lands remaining occupied?	Goshawk territory occupancy.
Are goshawk territories remaining occupied following vegetation management?	Goshawk territory occupancy.
Is mature and old forest habitat connectivity being adequately maintained?	Percent and distribution of mature and old forest cover.



**Table 4 - Summary of Monitoring Question, Indicator(s), and Methods**

Monitoring Question	Monitoring Indicator(s)
Is downed wood being maintained in sufficient amount, size, and location?	Quantity of downed logs and woody debris.
Are appropriate adjustments to grazing practices being made where grazing is contributing to at-risk conditions?	Ungulate grazing practices in at-risk locations.

## New Science or Other Information

No new science or information collected outside of this monitoring program was considered in the evaluation of this monitoring item.

## Monitoring Discussion, and Findings

The following results reflect updates from data collected in fiscal years 2017 and 2018. New information collected or compiled from the last evaluation report has been incorporated.

### ***1. Is the diversity of wildlife habitat being maintained by managing Vegetative Structural Stage (VSS) distribution across the planning area?***

During project development and analysis existing VSS distribution is assessed at the project level and incorporated into the proposed actions to maintain or trend conditions towards desired distribution according to the Forest Plan. Desired VSS of forested areas is 10% in VSS 1, 10% in VSS 2, 20% in VSS 3, 20% in VSS 4, 20 % in VSS 5, and 20% in VSS 6. Overall the Dixie is lacking in VSS 5 and VSS 6 class trees (mature to old growth) most likely due to historical timber practices. The lack of mature and old growth stands on the Forest limits the habitat needed for species such as the Northern goshawk and challenges the Forest to meet timber targets.

### ***2. Are forest management activities and/or natural events affecting the structure and function of upland and riparian ecosystems?***

Forest management activities are proposed and designed intended to enhance or protect ecosystems, improve forest health, and reduce the risk of effects from wildland fire. This is accomplished with project specific design features based on habitat or ecosystem conditions within project areas. Natural or other types of unplanned events such as the 2017 Brian Head Fire impact large swaths of landscape areas (71,000 acres) with varying degrees of effects.

### ***3. Is big game habitat maintained to meet Forest Plan desired conditions?***

During project level planning big game needs such as hiding and thermal cover are incorporated into proposed actions following the Forest Plan. Assessments of big game habitat are derived from State level big game monitoring reports. Based on evaluation of State level big game reports,

<sup>5</sup> Bonneville Cutthroat trout (BCT), Colorado River Cutthroat Trout (CRCT), Southern Leatherside, Chub, Virgin spinedace and Nonnative trout species.

<sup>6</sup> Mule deer, rocky mountain elk, wild turkey, Northern goshawk, Northern flicker, and sage-grouse, pygmy rabbit, spotted bat, Townsends Wester big-eared bat, bald eagle, sage-grouse, peregrine falcon, Flammulated owl, and three-toed woodpecker.

wildlife specific projects are proposed such as the Dixie Wildlife Water Development project (2017) to enhance big game habitat.

**4. *Are forest management activities and natural events affecting the ecological conditions indicated by the status of terrestrial focal species<sup>7</sup>?***

Focal species status are monitored at the project planning level. Proposed action treatments are developed and designed to mitigate impacts to focal species or where practical to improve habitat conditions for focal species. All focal species population levels on the Forest are maintaining desired or expected levels except for the Northern goshawk. The unplanned Brian Head Fire of 2017 impacted approximately 71,000 acres of wildlife habitat with varying degrees of effects. The fire reset the landscape to an earlier successional stage providing new grow of grasses, forbs, and saplings increasing the amount of forage for big game and other wildlife species. At the same time the fire burned over multiple known goshawk territories whose numbers were already in decline across the Forest. The resulting flooding and ash flows from the fire led to fish kills and sediment loading into numerous ponds, streams, and reservoirs.

**5. *Are management activities maintaining and improving the ability of lakes and streams on the Forest to maintain self-sustaining cold water fisheries?***

During 2017-2018 continuous water temperature data was collected at 21 locations on 14 different streams across the Forests (Table 5). Flooding, malfunctioning probes, probe battery life ending, and probes being buried resulted in some sites not collecting accurate data year-round. Periods of accurate data collection for each site are noted in the dates collected column.

All streams on the Forest are considered “Class 3A -- Protected for cold water species of game fish and other cold-water aquatic life, including the necessary aquatic organisms in their food chain.” This classification requires that maximum water temperatures be less than 20°C. Data collection showed that 15 of 20 sites (75%) where temperature data was collected in 2017 exceeded 20°C as a maximum. In 2018 9 of 15 (60%) sites where temperature data was collected show temperature exceeding 20°C. Flow volume seemed to play a role in maximum temperature as 5 of 7 (71%) sites deployed from 6/1-9/30 continuously in both 2017 and 2018 showed higher maximum temperature in 2018 which was a considerably lower flow year than 2017. Of the 10 streams that exceeded the 20°C maximum temperature all but one maintain, or have maintained, self-sustaining native or nonnative trout populations. Birch Creek (Main Canyon) has a transitory native trout population and the reaches in which the Santa Clara – Downstream from Pine Valley, Three mile Creek and Leeds Creek temperature probes were deployed show either low or wildly fluctuating trout standing crop. High temperatures may play a role in regulating trout standing crop at these sites.

As highlighted under the “Fish – Are forest management activities and natural events affecting the ecological conditions indicated by the status of focal species?” monitoring item, natural events continue to be the biggest driver of large-scale change in focal fish species on the Forest. Of the 61 stations quantitatively sampled for fish focal species in 2017-2018 39% had been affected by wildfire in the past 10 years. At all these stations the short term- and long-term post-fire impacts

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<sup>7</sup> Mule deer, rocky mountain elk, wild turkey, Northern goshawk, Northern flicker, and sage-grouse, pygmy rabbit, spotted bat, Townsends Western big-eared bat, bald eagle, sage-grouse, peregrine falcon, Flammulated owl, and three-toed woodpecker.

from large and small wildfires on the Forest were evident in reduced and eliminated standing crop and loss of occupied habitat for BCT, Southern leatherside and nonnative trout populations. Almost all of the remaining fluctuations in occupied habitat or standing crop can be explained by variations in habitat use or recruitment success based on changing annual environmental conditions (flow volume and temperature) or by Forest and UDWR management activities to expand focal species populations. North Fork Pinto Creek has shown a downward trend in nonnative trout standing crop during three consecutive sampling events over the past 13 years.

Monitoring shows that in general water quality is being at least maintained on the Forest. There were 3 waterbodies that are now listed on the 2016 impaired list that were not listed in 2014 and 4 that were listed in 2014 that are no longer listed in the 2016 list. Therefore, a net decrease of 1 listed water body has occurred between the 2 most recent listings. Water quality sampling performed by USFS personnel has shown that most of the water quality parameters are generally within state standards where the waterbodies are draining primarily NFS lands.

Water temperature monitoring showed that many streams monitored continuously for water temperature exceeded the maximum temperature required for the 3A beneficial use designations. Monitoring since the early 2000s have shown that many streams across the Forest have maximum temperatures that exceed 20°C, regardless of current management activities. Baseline data has been collected on several streams to compare against future data collection. This should help to determine any management related changes.

What are the implications?- 39% of the quantitative fish sampling stations completed on the Forest showed negative impacts to focal species population structure and occupied habitat from small and large wildfires in the past 10 years. Wildfire continues to be the main impact to native trout focal species on the Dixie National Forest in the past 17 years. Large tracts of late successional Forests with heavy fuel loadings will continue to be a high-level threat to native trout conservation efforts on the Forest. Without continued UDWR and Forest management activities to expand occupied habitat for native cutthroat trout focal species natural events would have dramatically reduced the overall occupied habitat for native cutthroat trout on the Forest over the past 2 years.

Climate change is predicted to result in higher future stream temperatures in many streams across the Dixie National Forest (<https://usfs.maps.arcgis.com/apps/webappviewer/index.html?id=bf3ff38068964700a1f278eb9a940dce>). Streams that already exceed 20°C are more vulnerable to loss of native and nonnative trout populations into the future.

Methods - Sampling in streams consists of multiple pass depletion population estimates using a backpack electrofisher. Fish are collected, enumerated, measured for total length and weighed. Density, standing crop and condition factor are calculated. Sampling in lakes consists of gill netting efforts. Fish are collected, enumerated, measured for total length and weighed. Catch rate and condition factor are calculated. Distribution is determined by establishing the upstream and downstream extent of species through electrofishing, netting, ocular surveys, and angling. The Utah Division of Wildlife Resources (UDWR) is the agency with primary responsibility for monitoring core and conservation populations of Bonneville cutthroat trout (BCT), Colorado River cutthroat trout (CRCT), Southern leatherside Chub and Virgin spinedace in southern Utah; however, Forest personnel cooperate and assist with sampling. Similarly UDWR is the agency with primary responsibility with lake and reservoir sport fisheries. Fish bearing streams across the Forest are visited on a 5-7 year interval for all known occupied focal species habitat. Lake surveys are completed on a less regular interval with high profile fisheries being sampled more frequently.

Water temperature was monitored with Stowaway Tidbit Temp Loggers (Onset Computer Corporation). Loggers were placed inside steel pipes with holes drilled in them and attached to rocks or roots with steel cables. Loggers recorded temperature every 15 minutes.

Forest biologists continue to work closely with state biologists to enhance cold water fisheries habitat. Several projects to restore and protect native cutthroat trout habitat and populations are ongoing across the Forest. Restoration efforts have occurred on all four districts and successful trout fishing can be enjoyed in numerous ponds and streams.

**Table 5 Dates of accurate deployment, minimum, average, maximum temperatures (°C), as well as the maximum diel fluctuation (°C) at 2017-2018 monitoring sites**

Site	Year	Dates	Minimum	Average	Maximum	Maximum diel fluctuation
Birch Creek (East Fork Sevier River)	2018	6/23/2018- 12/31/2018	0.1	7.7	21.5	12.3
Birch Creek (Main Canyon/Escalante)	2017	6/29/2017- 12/31/2017	0.4	8.5	24.5	12.9
Birch Creek (Main Canyon/Escalante)	2018	1/1/2018- 8/4/2018	0.4	8.0	19.1	6.4
Deer Creek	2017	1/1/2017- 6/14/2017	0.0	5.1	22.4	18.4
Deer Creek	2018	9/27/2018- 12/31/2018	0.2	3.3	15.6	9.3
DeLong Creek	2017	1/1/2017- 6/1/2017	0.1	3.7	14.6	9.2
East Fork Sevier River – Above Crawford Creek	2017	1/1/2017- 12/31/2017	-0.1	6.6	22.0	12.2
East Fork Sevier River – Above Crawford Creek	2018	1/1/2018- 5/2/2018	0.1	2.0	14.3	8.7
East Fork Sevier River – Below gaging station	2017	1/1/2017- 12/31/2017	-0.3	7.6	22.5	8.0
East Fork Sevier River – Below Kanab Creek	2017	1/1/2017- 12/31/2017	0.1	7.4	22.0	11.0
East Fork Sevier River – Below Kanab Creek	2018	1/1/2018- 5/2/2018	0.1	2.7	13.5	6.7
East Fork Sevier River – Toad Exclosure downstream	2017	1/1/2017- 12/31/2017	0.0	6.5	22.2	12.5
East Fork Sevier River – Toad Exclosure downstream	2018	1/1/2018- 12/31/2018	0.0	7.0	24.1	11.3
East Fork Sevier River – Toad Exclosure upstream	2017	1/1/2017- 3/10/2017, 5/12/2017- 12/31/2017	-6.2	6.7	20.2	10.7

Site	Year	Dates	Minimum	Average	Maximum	Maximum diel fluctuation
East Fork Sevier River – Toad Exclosure upstream	2018	1/1/2018-12/31/2018	-4.3	6.7	25.0	24.9
Leeds Creek	2017	1/1/2017-12/31/2017	0.3	10.0	20.6	7.0
Leeds Creek	2018	1/1/2018-12/31/2018	0.3	11.4	27.5	9.9
Left Fork Kanab Creek – Breeding pond	2017	1/1/2017-3/1/2017, 5/12/2017-12/31/2017	0.1	7.5	23.9	15.2
Left Fork Kanab Creek – Breeding pond	2018	1/1/2018-12/31/2018	0.1	8.0	23.0	9.0
Left Fork Kanab Creek – Downstream	2017	1/1/2017-12/31/2017	-0.7	6.4	23.9	17.1
Left Fork Kanab Creek – Downstream	2018	1/1/2018-12/31/2018	-0.2	7.0	23.2	16.1
Little Creek	2017	1/1/2017-9/19/2017	0.1	9.1	25.1	15.1
Pine Creek (Escalante) – Downstream	2017	1/1/2017-12/31/2017	0.1	7.4	22.4	10.2
Pine Creek (Escalante) – Downstream	2018	1/1/2018-8/4/2018	0.1	8.8	26.0	12.5
Pine Creek (Escalante) – Upstream	2017	1/1/2017-12/31/2017	-0.2	5.5	18.2	9.6
Pine Creek (Escalante) – Upstream	2018	1/1/2018-8/4/2018	0.1	6.2	19.1	9.6
Reservoir Canyon	2017	1/1/2017-11/1/2017	0.2	5.6	17.1	8.4
Santa Clara – Downstream from Pine Valley	2017	1/1/2017-12/31/2017	0.1	8.9	23.4	11.2
Santa Clara – Downstream from Pine Valley	2018	1/1/2018-12/31/2018	0.2	10.1	29.0	14.7
Santa Clara – Upstream from Central	2017	1/1/2017-9/15/2017	2.2	11.8	20.9	7.5
Three mile Creek	2017	6/1/2017-9/16/2017	5.7	16.5	26.6	16.9
Three mile Creek	2018	5/3/2018-7/27/2018, 9/7/2018-12/31/2018	0.8	9.2	25.7	16.8
Water Canyon	2017	1/1/2017-12/31/2017	0.1	6.1	16.7	7.2
Water Canyon	2018	1/1/2018-10/14/2018	0.2	7.7	19.8	16.5

Site	Year	Dates	Minimum	Average	Maximum	Maximum diel fluctuation
West Hunt Creek	2017	1/1/2017-5/17/2017	0.0	3.0	18.6	15.7

**6. Are forest management activities and/or natural events maintaining aquatic habitat to meet Forest Plan desired conditions and objectives or improving habitat to move toward those conditions and objectives?**

A total of 39 sites were read for the bank stability, bank cover, and Greenline to Greenline width long-term Multiple Indicator Monitoring Indicators in 2017 and 2018 (Table 6). The Forest Plan standard for bank stability is 50%; however, best available science indicates that the Forest Plan objective is considerably lower than what is necessary to maintain stream channel configuration. Taking into account all stream channel types, published literature, and professional observations we adopted 80% as our expected objective for bank stability. Additionally, the Forest Plan standard for bank cover is 80% in Riparian Management Areas, but no standard is set for non-designated riparian areas. In the absence of a standard for many streams, we adopted 80% bank cover as the BAS objective.

Of the sites read for long-term Multiple Indicator Monitoring Indicators in 2017-2018 29 (74%) were not meeting Forest Plan objectives for either bank cover or bank stability, BAS expectations for bank stability, or had a downward trend in at least one of the long-term indicators. Of the sites read were not meeting Forest Plan objectives for either bank cover or bank stability, BAS expectations for bank stability, or had a downward trend in at least one of the long-term indicators, 16 (55%) are known to have had flooding, ash flow and or debris flow impacts related to wildfire within the past 10 years.

According to vegetative data collected by the Forest Botanist 39% of riparian sites monitored are not meeting or moving toward desired conditions and objectives for aquatic habitat as set forth in the Dixie Forest Plan.

As highlighted in the “Fish – Are forest management activities and natural events affecting the ecological conditions indicated by the status of focal species?” monitoring item and reinforced with the results of the partial MIM results provided above, natural events continue to be the biggest driver of large-scale change in focal fish species on the Forest. Areas with recent wildfires show drastic changes in both fish abundance and distribution as, well as bank stability, bank cover and greenline to greenline width. Additionally, partial MIM, GDE and riparian vegetation surveys indicate that there are some areas where Forest Plan and Best Available Scientific Information objectives are being met and other areas where they are not (see “Riparian Area Changes - Are forest management activities affecting stream channels and riparian ecosystems?”, “Water - Are beneficial uses, identified by the state of Utah, being maintained for all water bodies?”, and “Quantity and Quality of Aquatic Habitats - Are management activities maintaining and improving the ability of lakes and streams on the Forest to maintain self-sustaining coldwater fisheries?” monitoring items.)



What are the implications? Wildfire continues to be the main impact to native trout focal species on the Dixie National Forest in the past 17 years. Large tracts of late successional Forests with heavy fuel loadings will continue to be a high-level threat to native trout conservation efforts on the Forest. Without continued UDWR and Forest management activities to expand occupied habitat for native cutthroat trout focal species natural events would have dramatically reduced the overall occupied habitat for native cutthroat trout on the Forest over the past 2 years. Active management, including mechanical stream restoration, riparian plantings and/or beaver reintroductions may be necessary to maintain and restore habitat negatively affected by post-fire impacts.

Climate change and activities that reduce overhead cover could both be contributing to water temperatures exceeding State maximums for beneficial use; however, long-term data suggests that these maximums have been exceeded for 15-20 years in some locations.

It is possible that sustained use activities such as grazing and recreational use had some negative influence on the monitoring results for riparian vegetation. Short-term management activities such as fuels reduction and timber operations also may have either positively or negatively affected the monitoring results for riparian vegetation depending on the individual monitoring site. Some GDEs are showing some negative effects from such management activities.

Methods - Sampling in streams consists of multiple pass depletion population estimates using a backpack electrofisher. Fish are collected, enumerated, measured for total length and weighed. Density, standing crop and condition factor are calculated. Sampling in lakes consists of gill netting efforts. Fish are collected, enumerated, measured for total length and weighed. Catch rate and condition factor are calculated. Distribution is determined by establishing the upstream and downstream extent of species through electrofishing, netting, ocular surveys, and angling. The Utah Division of Wildlife Resources (UDWR) is the agency with primary responsibility for monitoring core and conservation populations of Bonneville cutthroat trout (BCT), Colorado River cutthroat trout (CRCT), Southern leatherside Chub and Virgin spinedace in southern Utah; however, Forest personnel cooperate and assist with sampling. Similarly UDWR is the agency with primary responsibility with lake and reservoir sport fisheries. Fish bearing streams across the Forest are visited on a 5-7 year interval for all known occupied focal species habitat. Lake surveys are completed on a less regular interval with high profile fisheries being sampled more frequently.

Water temperature was monitored with Stowaway Tidbit Temp Loggers (Onset Computer Corporation). Loggers were placed inside steel pipes with holes drilled in them and attached to rocks or roots with steel cables. Loggers recorded temperature every 15 minutes.

Stream bank stability, stream bank cover, and greenline to greenline width are measured using the Multiple Indicator Methodology (Burton, Smith, & Cowley, 2011).

**Table 6. Average percent bank alteration, percent bank stability, percent bank cover and greenline to greenline width (GGW) measured during Partial Multiple Indicator Monitoring (MIM) surveys in 2017-2018 (Burton, Smith, & Cowley, 2011).**

Stream	Location	Year	Bank alteration	Bank Stability	Bank Cover	GGW (m)
Birch Creek (East Fork Sevier)	4124	2017	6%	85%	56%	1.40
Birch Creek (East Fork Sevier)	6067	2017	0%	63%	42%	2.30

Stream	Location	Year	Bank alteration	Bank Stability	Bank Cover	GGW (m)
Birch Creek (Escalante)	2021	2017	19%	78%	77%	3.00
Cottonwood Creek	6046	2017	1%	55%	28%	2.70
East Fork Sevier River	Crawford Riparian Exclosure (livestock side)	2017	10%	84%	77%	3.55
East Fork Sevier River	Crawford Riparian Exclosure (wildlife side)	2017	4%	89%	77%	3.85
East Fork Sevier River	Kanab Riparian Exclosure (livestock side)	2017	5%	94%	88%	4.13
East Fork Sevier River	Kanab Riparian Exclosure (wildlife side)	2017	4%	91%	89%	3.74
East Fork Sevier River	Seiler Riparian Exclosure (livestock side)	2017	5%	73%	45%	2.94
East Fork Sevier River	Seiler Riparian Exclosure (wildlife side)	2017	5%	70%	59%	2.78
Hall Creek	2022	2017	7%	80%	81%	1.54
Horse Creek	6066	2017	0%	24%	11%	4.60
Ranch Creek	5056	2017	1%	97%	90%	0.90
Sweetwater Creek	4129	2017	0%	81%	70%	1.29
Bunker Creek	8067	2018	2%	47%	48%	5.9
Clear Creek	6131	2018	0%	53%	49%	3.40
Gap Spring	7093	2018	9%	78%	75%	1.3
Hungry Creek	2026	2018	15%	90%	98%	0.7
Indian Hollow	9028	2018	37%	53%	55%	3
Ipson Creek	7129	2018	0%	93%	92%	1.7
Left Fork Sandy Creek	7143	2018	21%	72%	68%	0.6
Little Creek Tributary	7010	2018	27%	88%	94%	0.7
Lower Little Creek	1443	2018	1%	56%	49%	4.5
Mortensen Canyon	7047	2018	2%	64%	58%	3.2
North Fork Three mile	2004	2018	28%	31%	33%	2.1
Pine Creek (Cowpuncher G.S.)	2028	2018	1%	95%	90%	2.9
Pinto Creek - Cove Hollow Confluence	1404	2018	4%	32%	30%	8.8
Red Creek	6025	2018	1%	55%	40%	4.3
Red Creek	Downstream Quantitative Fish station	2018	19%	70%	69%	3.2
Red Creek Reservoir Inlet	6024	2018	0%	35%	24%	13.9



Stream	Location	Year	Bank alteration	Bank Stability	Bank Cover	GGW (m)
Red Creek Tributary	6026	2018	2%	54%	58%	1.2
Right Fork Bunker Creek	6036	2018	5%	56%	56%	6.1
Shinbone Creek	7006	2018	2%	84%	91%	1.20
Three mile Creek	7044	2018	11%	61%	57%	2.5
Upper Indian Hollow GL	1407	2018	18%	37%	35%	2
Upper Little Creek	1349	2018	0%	20%	4%	8.8
Water Canyon	5022	2018	10%	67%	60%	1.7
Williamson	8126	2018	20%	33%	30%	3.9
Willow Spring	1335	2018	2%	99%	99%	0.1

**7. Are TES plant habitats being protected from forest plan implementation activities and maintaining sufficient numbers and distribution to maintain viable populations across the Forest?**

The effects to TES plant habitats are analyzed during project level planning and across the Forest during annual monitoring. Project specific design features are incorporated into projects to minimize impacts to TES plants. Annual road maintenance destroyed a few Sensitive plants at one monitoring location that was adjacent to a road. This management activity caused a decline in plant numbers at the monitoring site. More time is needed to assess the overall impact of road maintenance on TES plants.

**8. Are forest management activities and natural events affecting the ecological conditions indicated by the status of aquatic focal species<sup>8</sup>?**

Of the quantitative fish focal species monitoring sites sampled in FY2017 and FY2018, 65% reported greater than a 20% decline in standing crop or had no focal species remaining. Natural events and forest management activities may be affecting fish focal species at these monitoring sites. 60% of these sites with a decline are known to have had flooding, ash flow, and or debris flow impacts related to wildfire within the past 10 years. All but one of the remaining sites are within the realm of variability displayed in past sampling efforts and declines are probably attributable to natural runoff and temperature variability combined with fish passage obstructions. Declines in North Fork Pinto Creek could also be related to forest management activities (recreation, roads, and livestock management). Further evaluation of these sites may be warranted to determine if a change in management direction is needed. Refer to the Forest Fish Biologist to assess the direction of change and evaluate if there is mitigation that will improve them. Continue to monitor focal species, by district, annually. If this process fails to improve sites over time, a

<sup>8</sup> Bonneville Cutthroat trout (BCT), Colorado River Cutthroat Trout (CRCT), Southern Leatherside, Chub, Virgin spinedace and Nonnative trout species.

change in Forest Plan may be warranted. This should be done for each monitoring area where monitoring showed a greater than 20% decline in standing crop or no focal species remaining. Continue to cooperate with UDWR to monitor fish focal species population structure and occupied habitat and report annually. Work to plan vegetation and fuel reduction treatments in watersheds with high priority focal species populations to reduce the risk of uncharacteristically large and severe wildfires. Continue to work with UDWR to fulfill regional obligations for focal species conservation contained in Conservation Agreements and Strategies, as well as other jointly developed management plans.

***9. Are TES animal habitats being protected from forest plan implementation activities and maintaining sufficient numbers and distribution to maintain viable populations across the Forest?***

Direct mortality and habitat degradation from post-wildfire flooding, ash flows and debris flows continue to impact Sensitive fish populations on the Forest and were responsible for the combined loss of 31.1 km (19.3 miles) of occupied BCT habitat in 2017-2018. Since boreal toad began to be monitored in the 1990s only two breeding areas have been identified on Boulder Mountain, with the most recent being documented for the first time in 2011. Populations on the Boulder have always seemed to be low in numbers and had sporadic breeding success. In the early 2000s boreal toad populations dropped precipitously on the Paunsaugunt Plateau. The population has tested positive for chytrid fungus (*Batrachochytrium dendrobatidis*) which has caused reduced survival and population declines in other boreal toad populations within the Intermountain West. In addition to infection by chytrid fungus boreal toad breeding habitat on the Paunsaugunt Plateau began to decline in the 2000s. The decline in numbers of toad and number of breeding areas is a probable result of the combination of these two factors. Multiple use activities such as prescribed fire, timber harvest, roads, and livestock management can also have impacts to boreal toad and their habitats and are present adjacent to both the Boulder Mountain and Paunsaugunt Plateau populations. Further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them.

There are no known T&E species currently present on the Forest. The Forest is considered dispersal habitat for Mexican spotted owl and California condor foraging habitat given both species are known to occur south of the Forest on National Park lands. Habitat conditions for T&E species is reviewed during project development analysis. Where applicable T&E species habitat is protected or enhanced as a planned proposed action.

***10. Is the spatial arrangement of snags in condition to meet needs of cavity nesters?***

Spatial arrangement and density of snags on the Forest is reviewed during the project development phase. Specific project level design features are incorporated into proposed treatments as established by the Forest Plan and the 2000 goshawk amendment to satisfy the needs of cavity nesters as well as providing habitat for prey species for the goshawk.

***11. Are known goshawk territories on NFS lands remaining occupied?***

Goshawk populations are below Minimal Viable Population levels on the Forest and have been experiencing a downward trend for the last four years. Goshawk population trends are also down

in Utah, across the Intermountain region, and across all survey areas. Goshawk population numbers across the Dixie NF are a reflection of region wide trends. Suggested management change would be to evaluate goshawk territory occupancy on the Forest in relation to regional goshawk population levels. The monitoring assessment does not account for factors influencing regional population levels beyond management control on the Forest. Further planning efforts are also needed at the Forest level to protect and enhance mature/old growth habitat for wildlife species dependent on this habitat type.

***12. Are goshawk territories remaining occupied following vegetation management?***

Goshawk territory occupancy on the Forest has been declining for the last four years (2015-2019) at all known territories. The decline in territory occupancy does not appear to be related to vegetation management treatments.

***13. Is mature and old forest habitat connectivity being adequately maintained?***

A significant portion of the Dixie's mature and old growth forest stands were logged over at a time prior to today's contemporary science based practices. As a result it is not only difficult for the Forest to meet timber target goals, habitat for wildlife species dependent on mature and old growth forests is often lacking. During project development analysis mature and old growth stands (VSS 5 & VSS 6) are assessed and project specific design features are incorporated into proposed actions to protect mature and old growth stands.

***14. Is downed wood being maintained in sufficient amount, size, and location?***

Down woody debris levels on the Forest is reviewed during project development planning. Specific project level design features are incorporated into proposed treatments as established by the Forest Plan and the 2000 goshawk amendment to provide habitat for prey species for the goshawk.

***15. Are appropriate adjustments to grazing practices being made where grazing is contributing to at-risk conditions?***

Grazing impact monitoring is conducted and evaluated by the Forest Botanist and Fisheries Biologist across the Forest on a multi-year rotational basis. Long term trend data is provided to district range technicians. The greatest risk of impacts from grazing is to riparian habitat. Range specialists review conditions and discuss grazing impacts with permittees during annual permit review meetings.

## **Adaptive Management Considerations**

The forest plan monitoring program is meant to “enable the responsible official to determine if a change in plan components or other plan content that guide management of resources on the plan area may be needed” (36 CFR 219.12).

Regarding the ability of lakes and streams on the Forest to maintain self-sustaining cold water fisheries, North Fork Pinto Creek has shown a downward trend in nonnative trout standing crop during

three consecutive sampling events over the past 13 years. Further evaluation of North Fork Pinto Creek may be warranted to determine if a change in management direction is needed. Similarly, further evaluation of recovery from post-fire impacts and Forest and UDWR restoration activities is necessary to determine if a change in management direction is needed. It is recommended to continue to cooperate with UDWR to monitor fish focal species population structure and occupied habitat and report annually. Work to plan vegetation and fuel reduction treatments in watersheds with high priority focal species populations to reduce the risk of uncharacteristically large and severe wildfires. Continue to work with UDWR to fulfill Regional obligations for focal species conservation contained in Conservation Agreements and Strategies. Additionally, it is recommended to continue monitoring water temperature continuously at multiple long-term and short-term sites across the Forest and report annually. Management actions that promote water source protections and maintenance of stream bank stability and overhead vegetation may assist in preserving lower maximum stream temperatures and should be pursued.

Regarding maintaining aquatic habitat to meet Forest Plan desired conditions and objectives or improving habitat to move toward those conditions and objectives, according to vegetative data collected by the Forest Botanist 39% of riparian sites monitored are not meeting or moving toward desired conditions and objectives for aquatic habitat as set forth in the Dixie Forest Plan. Further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them. Without continued UDWR and Forest management activities to expand occupied habitat for native cutthroat trout focal species natural events would have dramatically reduced the overall occupied habitat for native cutthroat trout on the Forest over the past 2 years. Active management, including mechanical stream restoration, riparian plantings and/or beaver reintroductions may be necessary to maintain and restore habitat negatively affected by post-fire impacts. Therefore, it is recommended that the Dixie continue to cooperate with UDWR to monitor fish focal species population structure and occupied habitat and report annually and work to plan vegetation and fuel reduction treatments in watersheds with high priority focal species populations to reduce the risk of uncharacteristically large and severe wildfires. Continue to work with UDWR to fulfill Regional obligations for focal species conservation contained in Conservation Agreements and Strategies. Also, continue to monitor partial MIM indicators, water quality, water temperature, riparian vegetation and GDE condition and work to have all responsible specialists jointly evaluate all of these monitoring data together in light of management activities such as timber sales, fuels treatments and livestock management so that sites where current management may be a factor can be addressed with management changes. It is recommended to complete additional GDE surveys in timber sales to further evaluate the potential impacts of management.

For quantitative fish focal species monitoring sites sampled in FY2017 and FY2018, further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them. This should be done for each monitoring area where monitoring showed a greater than 20% decline in standing crop or no focal species remaining. Continue to cooperate with UDWR to monitor fish focal species population structure and occupied habitat and report annually. Work to plan vegetation and fuel reduction treatments in watersheds with high priority focal species populations to reduce the risk of uncharacteristically large and severe wildfires. Continue to work with UDWR to fulfill Regional obligations for focal species conservation contained in Conservation Agreements and Strategies, as well as other jointly developed management plans. Refer to the Forest Fish Biologist to assess the direction of change and evaluate if there is mitigation that will improve them, if needed. Continue to monitor focal species, by district, annually. If this process fails to improve sites over time, a change in Forest Plan may be warranted.

Goshawk populations are below MVP. Goshawk population trends are down in Utah, across the Intermountain region, and across all survey areas. These trends are a reflection of goshawk population numbers across the Dixie NF. Suggested change would be to evaluate goshawk territory occupancy on the Forest in relation to regional goshawk population levels.

Forest Assessment - Monitoring assessment does not account for factors influencing regional population levels beyond management control on the Forest. Compare Forest level population level relative to regional population levels

For TES plant habitats much of the data was collected between 2017 and 2018 field seasons. This is not a large enough time frame to properly assess variability in numbers and trend. Refer to the Forest Botanist to assess the sufficiency of TES plant numbers, distribution, and viability and evaluate if there is mitigation that will improve them. Continue to monitor TES plant habitats for population trend, distribution, and viability and report, via the Forest monitoring report, every two years. If this process fails to maintain or improve these plant populations over time, a change in Forest Plan may be warranted.

For TES animal habitats direct mortality and habitat degradation from post-wildfire flooding, ash flows and debris flows continue to impact Sensitive fish populations on the Forest and were responsible for the combined loss of 31.1 km (19.3 miles) of occupied BCT habitat in 2017-2018 alone. In addition to infection by chytrid fungus and a decline in boreal toad breeding habitat on the Paunsaugunt Plateau since the 2000s, multiple use activities such as prescribed fire, timber harvest, roads, and livestock management can also have impacts to boreal toad and their habitats and are present adjacent to both the Boulder Mountain and Paunsaugunt Plateau populations. Further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them. Refer to the Forest Fish Biologist to assess the direction of change and evaluate if there is mitigation that will improve them, if needed. Continue to monitor Sensitive species, by district, annually. If this process fails to improve sites over time, a change in Forest Plan may be warranted.

## Monitoring Item 4 Range Resources

Rangeland resources on the Dixie NF are extremely valuable to the productivity of the forest. Not only from an ecological standpoint, but also from an economic standpoint. Livestock grazing is a viable use of National Forest lands and provides an economic benefit to the surrounding communities and counties. Tracking the number of animal unit month's (AUM's) is a means of determining how livestock grazing is benefiting these communities. In order for livestock grazing to be successful it needs to be done correctly and to ensure that rangeland resources are being used correctly. Hence, short and long term monitoring are necessary to ensure that resources are not being degraded and if they are determining how to remedy the situation.

Noxious weeds pose a serious risk to ecological diversity and productivity of rangelands. Areas that become dominated by noxious weeds become less productive and utilized less by both wildlife and livestock. Regular monitoring is needed to document extent of existing infestations, location of new ones and the efficacy of treatment activities.

**Table 7 - Summary of Monitoring Question and Indicator(s)**

Monitoring Question	Monitoring Indicator(s)
Are goods and services being provided in accordance with Forest Plan goals and objectives?	Level of permitted livestock grazing.
Are desired conditions for rangeland plant communities being met in regards to species composition, trend and ground cover?	Range condition, trend and ground cover.
What is the extent of the change of ecological conditions due to invasive species?	Estimated acres infested with invasive plants and noxious weeds.

## New Science or Other Information

No new science or information collected outside of this monitoring program was considered in the evaluation of this monitoring item.

## Monitoring Discussion and Findings

### *1. Are goods and services being provided in accordance with Forest Plan goals and objectives?*

The range management activity list for monitoring is the number of permitted animal unit months (AUMs). Number of AUMs from 2014-2018 have ranged from a low of 85,990 to a high of 91,426 with an average of 87,805. This is nearly 80 percent of the maximum capability of the Dixie as disclosed in the 1986 forest plan. However, 80 percent is an underestimate since the maximum capability number from the 1986 forest plan included the Teasdale Ranger District which is now administered by the Fishlake National Forest and the AUMs in this report don't include the Teasdale Ranger District. Additionally, natural events such as drought and fire (such as the 2017 Brianhead and 2018 West Valley fires and the 2018 severe drought) affect rangeland conditions from year to year which in turn can affect the number of AUMs allowed while still being able to stay within Forest Plan goals and objectives for all of the other purposes served by rangeland resources (like wildlife and watershed function). Therefore, monitoring suggests that goods and services in the form of grazing were provided in accordance with Forest Plan goals and objectives during 2017 and 2018.

### *2. Are desired conditions for rangeland plant communities being met in regards to species composition, trend and ground cover?*

Desired conditions for rangeland plant communities are being met in regards to species composition, trend and ground cover on 355 of the 550 (65%) of the monitoring sites read during 2017 and 2018. On the remaining 195 monitoring sites (35%), desired conditions for rangeland plant communities are not being met. Of the 195 monitoring sites not meeting desired conditions, 55 (28%) were directly impacted by wildfire which active management has



no immediate control over. This means that 140 monitoring sites (25% of all 550 monitoring studies read in 2017 and 2018) failed to meet desired conditions for rangeland plant communities and may be a result of any management activity not influenced by uncontrolled wildfire. These 140 monitoring sites not meeting desired conditions for rangeland plant communities are located on 50 allotments of the Pine Valley, Cedar City, Powell, Escalante, and Teasdale Ranger Districts. These monitoring sites may have been affected by any combination of annual micro-climatic shifts, change in water regime, habitat type changes, ecotone drift, and management activities within the monitoring area. It is possible that sustained use activities such as grazing and recreational use had some negative influence on the monitoring results. Short-term management activities such as fuels reduction and timber operations also may have either positively or negatively affected the monitoring results depending on the individual monitoring site. These activities may have influenced monitoring results in the following ways:

Grazing –loss of available forage and cover, trampling, soil compaction, loss of riparian channel stability

Recreational Use –dispersed localized use may have resulted in damage to vegetation, lower effective ground cover, soil compaction affecting water absorption and retention

Fuels Reduction & Timber Operations –reduced vegetation, altered habitat structure, and soils compaction

### **3. *What is the extent of the change of ecological conditions due to invasive species?***

There are currently 7,490 acres across the forest invested with 15 different species of noxious weeds. The top three are Scotch thistle, salt cedar and bull thistle, in that order. This is a decrease of 1,258 acres from what was reported in 2012. The reduction in acres is likely due to weed treatment activities and improved mapping. Treatment efforts over the past four years (2015-2018) have treated about 9,600 acres with the average amount of 2,400 acres/yr. The lowest treatment year was 2018, due to budget restraints. If budgets like that received in 2018 continue, the lack of funding to fully implement noxious weed detection and eradication program could lead to increases in invasive weed species.

## **Adaptive Management Considerations**

Further evaluation of rangeland plant community sites may be warranted to determine if a change in management direction is needed and able to improve them. Monitoring areas not meeting desired condition for rangeland plant communities are sent to the appropriate District rangeland management specialist to be evaluated. If the range specialist determines that these areas are able to be improved through permit action, then an adjustment in the AOI's for each site affected should be made. Continue to monitor rangeland plant communities and report, by district, annually. If this process fails to improve sites over time, a change in Forest Plan may be warranted.

## Monitoring Item 5 Timber

Monitoring insect and disease activity in timbered areas across the Dixie National Forest is vital in helping plan to maintain or, in some cases, restore a healthy forested landscape. Some insect and disease activity is ‘normal’ and part of the natural process. But how can one tell if the natural process is expanding and has the potential to cause extensive damage? This is part of the benefit of monitoring insect and disease activity – to see if it is more of an endemic process or an epidemic. Oftentimes insect and disease activity is a byproduct of forest health. When a forested area is unhealthy due to it being too dense (an abnormally high stocking level of trees) or involves the growing of the wrong tree species for the site the existing trees undergo stress from a lack of suitable resources such as water and/or light. When trees undergo stress they are more susceptible to succumb to insect and disease issues. Through observing insect and disease activities by the gathering of site data (Common Stand Exam) or by aerial detection through Forest Health flights patterns can be identified and vegetation management activities planned to help reduce the effects of such activities if needed. Over the last several decades the Dixie has experienced some instrumental changes in vegetation due to a number of events – an extensive spruce beetle outbreak in the 1990’s to early 2000’s, Douglas-fir beetle attacks, Western spruce budworm attacks, Mistletoe activity, Aspen decline, several large wildfires, and even local wind events. Through the monitoring of the results of these events proper vegetation management can be planned to help minimize their spread as well as potential negative effects.

Why is forest health important? Because the Dixie National Forest attracts many visitors, both local and non-local, to enjoy the scenic beauty whether driving, hiking, biking or even skiing. A forested landscape is more than just a stand of trees; it’s actually habitat for wildlife. A forested landscape supports clean water, and it can also provide local jobs through wood production. Monitoring insect and disease activity is a way to help ensure the Dixie stays as healthy as possible, and that it can provide the many benefits a healthy forest has to offer.

**Table 8 - Summary of Monitoring Question and Indicator(s)**

Monitoring Question	Monitoring Indicator(s)
Are vegetation conditions stable or moving toward Forest Plan desired conditions?	Extent of insect and disease infestations.

## New Science or Other Information

No new science or information collected outside of this monitoring program was considered in the evaluation of this monitoring item.

## Monitoring Discussion and Findings

### *1. Are vegetation conditions stable or moving toward Forest Plan desired conditions?*

As projects are planned and common stand exam data is collected, prescriptions are tailored to improve the forest health conditions of the area within the project. Part of the information that is observed and collected relates to forest health, i.e., insect and disease occurrence, etc. Aerial detection can also help steer new projects in areas of concern for forest health once those areas are ground-truthed if that is deemed necessary. The last two summers we have had forest site



visits from regional forest health protection staff that have greatly helped in our planning process as well as basic inventory of areas and great general direction and instruction to improve forest health. One such visit was in the summer of 2017 to visit the Ranch Creek Watershed and Riparian Improvement Project. Another visit was made in the summer of 2018. The 2018, visit involved two campgrounds, a hiking trail, and areas burned by the Brianhead Fire of 2017, all on the Cedar City RD and one site on the Powell Ranger District – Left fork of the Kanab Creek of the East fork of the Upper Sevier River. This visit was to verify results of the 2018 forest insect and disease aerial survey of the area as well as visit stands in the area that are proposed for treatment as part of the Boreal Toad Habitat project.

Results from the 2017 aerial detection indicate the following:

Pine Valley – approx. 362 acres (28 acres severely so) affected by Fir Engraver  
approx. 168 acres (13 acres severely so) affected by Pinyon Ips  
approx. 30 acres (2 acres severely so) affected by Spruce Beetle  
Cedar City - approx. 436 acres (87 acres severely so) affected by Western Spruce  
Budworm  
approx. 22 acres (2 acres severely so) affected by Western Pine Beetle  
Powell - approx. 605 acres (174 severely so) affected by Western Spruce Budworm  
approx. 90 acres (53 acres severely so) affected by Pinyon Ips  
approx. 97 acres (13 acres severely so) affected by Western Pine Beetle  
approx. 67 acres (5 acres severely so) affected by Douglas-fir Beetle  
Escalante - approx. 9,881 acres (5252 acres severely so) affected by Western Spruce  
Budworm  
approx. 78 acres (11 acres severely so) affected by Douglas-fir Beetle  
approx. 67 acres (11 acres severely so) affected by Western Pine Beetle

While spruce beetle infestations have slowed, it is important to continue monitoring their activity in areas that haven't experienced an epidemic. While much of the Cedar City RD has undergone a spruce beetle epidemic, the Escalante RD has not had such widespread epidemics but are at high susceptibility of future infestations. Other insects and disease have increased over the past ten years such as Douglas fir beetle and dwarf mistletoe. These increases have prompted more salvage and delayed other treatment activities such as improving growth in stands of green trees.

## **Adaptive Management Considerations**

A variation causing further evaluation and/or change in management direction has been identified. It is recommended that we continue documenting forest health issues through common stand exam work, annual aerial surveys, and other forest health protection field work.

Currently, the sustainable timber harvest for the Dixie is being reviewed. No need, at this time, to make changes in the Forest Plan until a better “picture has been painted”. Instead of an actual change in the Forest Plan, an effort should be made to see what areas are in need of TSI work, and, where warranted, a renewed focus on the need for TSI should be made.

## **Monitoring Item 6 Water and Soil Resources**

Water and soil resources on the Dixie are extremely valuable to not only the downstream communities that depend on clean water but also to the ecosystems that are on the forest of which is in a semi-arid

landscape. Maintaining soil productivity and water quality sufficient for beneficial uses of the water on the forest is of critical importance. Therefore activities that affect stream channels, the natural conveyance system for surface waters, and soil and riparian ecosystems, the natural filter for such water, are important to monitor for how they may be affecting these critical resources. Likewise, monitoring for adherence to and effectiveness of Best Management Practices is important for understanding how we are doing at protecting water and soil resources on the forest.

**Table 9 - Summary of Monitoring Question and Indicator(s)**

Monitoring Question	Monitoring Indicator(s)
Are beneficial uses, identified by the state of Utah, being maintained for all water bodies?	Impairment or degradation of water quality. Number of impaired or degraded water bodies
Are forest management activities affecting stream channels and riparian ecosystems?	Riparian ecosystem vegetation diversity, condition, trend, structure and ground cover. Riparian species occupied habitat and population structure. Stream channel condition, morphology, bank stability and substrate composition. Riparian species occupied habitat and population structure.
Are appropriate BMPs being followed with forest management activities and are they meeting their intended effectiveness with respect to impacts to riparian ecosystems?	BMP compliance and effectiveness
Are forest management activities impairing soil productivity of the land?	Changes in soil properties (physical, chemical, and/or biological) and ground cover that result in the loss of the inherent ecological capacity or hydrologic function of the soil resource.

## New Science or Other Information

No new science or information collected outside of this monitoring program was considered in the evaluation of this monitoring item.

## Monitoring Discussion and Findings

### *1. Are beneficial uses, identified by the state of Utah, being maintained for all water bodies?*

Monitoring shows that in general water quality is being at least maintained on the Forest. There were 3 waterbodies that are now listed on the 2016 impaired list (the most current list) that were not listed in 2014 and 4 that were listed in 2014 that are no longer listed in the 2016 list. Therefore, a net decrease of 1 listed water body has occurred between the 2 most recent listings. Water quality sampling performed by USFS personnel has shown that most of the water quality parameters are generally within state standards where the waterbodies are draining primarily NFS lands. One exception is with exceedance in Phosphorus levels. However, over the years of sampling it has been noted that many of the waterbodies sampled

on the Dixie National Forest have had phosphorus levels in exceedance of the state standard of 0.05 mg/L. It is thought that the contributing watersheds lithology is naturally high in phosphorus and accounts for the higher level of phosphorus. *E. coli* was another parameter sampled (only during 2018) that had a point-in-time maximum level exceedance in the state's *E. coli* standard of 409 organisms/100ml. This exceedance occurred in July for Clear Creek at two locations (Upper and Lower Clear Creek) but was statistically significantly higher at the lower sampling location where the stream drains through a private subdivision built in the riparian area (>2419 organisms/100ml vs 579 organisms/100ml). Since sampling is done discretely (once per month) and the temporal extent of some of the parameters is not known, it is unknown if other acute exceedances occurred throughout the years 2017 and 2018.

## **2. *Are forest management activities affecting stream channels and riparian ecosystems?***

During 2017 and 2018, 140 riparian level III (greenline) monitoring studies were completed on the Dixie National Forest. These monitoring studies were performed in 48 allotments across the Dixie National Forest. This work was accomplished by the Forest Vegetation Monitoring Crew. All 140 of the FS Level III Riparian Inventories (100%) were replicated and have accurate trend available. Of the 140 replicated Level III Riparian Inventories, the data analysis on 37 of them (26%) indicate a slightly downward or downward trend in vegetative successional status, bank stability, and/or effective ground cover. 46 of the 140 replicated Level III Riparian Inventories (33%) indicate slightly upward or upward trends in vegetative successional status, bank stability, and/or effective ground cover. For riparian monitoring sites, riparian ecosystem vegetation diversity, condition, trend, structure and ground cover are based on the measurement and evaluation of vegetative successional status, bank stability, and effective ground cover.

There were 83 monitored riparian level III inventory sites (59%) in 2017 and 2018 that demonstrated vegetative change (trending upward or downward) in 2017 and 2018. There were 57 riparian monitoring sites (41%) that were assessed with stable trends.

Thirteen of the 83 (16%) monitoring sites exhibiting a positive or negative change (trend shift) were directly impacted by wildfire which active forest management has no immediate control over. The remaining 70 monitoring sites of 83 (50% of all riparian level III greenline studies read in 2017 and 2018) exhibited vegetative change that may be a result of any forest management activity not influenced by uncontrolled wildfire. These 70 monitoring sites are located on 30 allotments of the Pine Valley, Cedar City, Powell, Escalante, and Teasdale Ranger Districts. Vegetation on these 70 riparian monitoring sites trended up (39 monitoring sites) or down (31 monitoring sites) between their previous reading and 2017 or 2018. These vegetative shifts may be a result of any forest management activity not influenced by uncontrolled wildfire. Further evaluation of these sites may be warranted to determine if a change in management direction is needed.

Other monitoring results did not provide all the information necessary to completely answer this question. Due to limited financial resources channel cross sections monitored were all conducted within or downstream of the Brian Head fire to monitor change associated with post fire events. With timber harvest activities more groundwater dependent ecosystem (GDE) sites need to be monitored in order to determine if that activity is affecting riparian ecosystems (only 1 GDE was monitored that was within a timber harvest area that had activity during 2017-2018).

## **3. *Are appropriate BMPs being followed with forest management activities and are they meeting their intended effectiveness with respect to impacts to riparian ecosystems?***

BMP compliance and effectiveness is not as anticipated with 55% of the activities monitored since 2014. Only 3 categories of activities have more than 2 projects that have been monitored and therefore specific activity BMP compliance and effectiveness is only reported on those categories with more than 2 projects, which are Grazing, Ground Based Skidding and Harvesting, and Mechanical Site Treatments (without skidding). Results from BMP monitoring since 2014 found that 60% of the ground based skidding and harvesting projects and 30% of mechanical site treatments failed some aspect of compliance with or effectiveness of the BMPs analyzed for use in the NEPA documents. This failure was attributed to a lack of effective crosswalk from NEPA documents to the contract during contract development. With Range allotments during this same time frame 83% of the allotments/pastures monitored failed some aspect of compliance with BMPs derived either from the NEPA and annual use operating documents authorizing the grazing or forest plan standards for riparian areas as they relate to grazing. It is unknown exactly why adhering to BMPs did not occur. As more projects are monitored the sample size will increase along with greater confidence in answering the question as to if BMPs are being followed and are effective.

**4. *Are forest management activities impairing soil productivity of the land?***

The monitoring results did not provide all the information necessary to completely answer this question. There was only soil productivity data collected in timbered areas of the forest that had timber harvest or prescribed burning as treatments. Data regarding soil productivity on rangelands is also needed. With timber harvest projects monitored, the percentage of points with detrimental soil disturbance was low with an average of 10%. For prescribed fire, Soil burn severity was low across 96% of the project area monitored. The Brianhead fire in 2017 had some undesirable impacts in soil productivity by leading to severe erosion and loss of humic matter and associated loss of soil productivity.

## **Adaptive Management Considerations**

Water quality sampling should continue in order to sample a larger percent of the forests stream population. With timber harvest activities more groundwater dependent ecosystem (GDE) sites need to be monitored in order to determine if that activity is affecting riparian ecosystems. More management activities, such as rangeland activities, need to have data collection on them regarding soil productivity. For BMP adherence and effectiveness to better implement plan component intent, changes are recommended in the quality of implementation of actions. For vegetation management, it is recommended that emphasis at both the planning level and the contract development level be put on cross-walking BMPs into contract documents for implementing the actions. For range management, it is recommended that priority and backing be given to administering the allotments to standard with regards to the riparian areas.

## **Monitoring Item 7 Facilities**

Monitoring the condition of Forest facilities is tied almost entirely to public safety. The condition of drinking water collection and distribution systems at campgrounds, visitor centers and bunkhouses are monitored to ensure drinking water quality meets state standards. The condition of high hazard dams is

monitored to ensure downstream communities are not at risk. The condition of roads and bridges are monitored because poorly maintained transportation systems have led to injuries. When facilities are monitored and the condition is shared with line officers, the most important problems rise to the top of funding priority lists and public safety is maintained.

**Table 10 - Summary of Monitoring Question and Indicator(s)**

Monitoring Question	Monitoring Indicator(s)
Is adequate road access and maintenance being provided?	Miles of classified road open for public use. Number and condition of deficient bridges.
Are open roads maintained to standard?	Miles of road maintained to standard.
Do potable and non-potable water systems meet Federal, State, and Local requirements?	Water quality monitoring results and condition surveys.
Do dams on Forest Service lands meet State and Local safety requirements?	Critical safety items identified during dam inspections.

## New Science or Other Information

No new science or information collected outside of this monitoring program was considered in the evaluation of this monitoring item.

## Monitoring Discussion and Findings

### *1. Is adequate road access and maintenance being provided?*

Ten roads and 52 bridges were surveyed for answering this question during fiscal years 2017 and 2018. While the number of miles of roads open to the public is trending down the level of maintenance of open roads is staying consistent. Line officers have decided that the number of miles of open road required to maintain adequate road access has declined over time. Of the 52 bridges surveyed, 10 were found to be structurally and/or deficient. Based on the number and condition of deficient bridges, road maintenance is neither improving nor deteriorating over time.

### *2. Are open roads maintained to standard?*

The forest is only able to maintain a small percentage of open roads each fiscal year. In 2017 and 2018 480 and 474 miles were maintained, respectively. Most of the roads improvements based around drainage and placing new bed material. Those roads are maintained to standard.

**3. *Do potable and non-potable water systems meet Federal, State, and Local requirements?***

All drinking water systems on the Dixie National Forest have been monitored in accordance with State and Federal standards in 2017 and 2108. In 2017 we had 6 water systems surveyed by the state of Utah. They completed the sanitary survey for the following areas: Honeycomb Rock CG, Red Canyon CG, Posy Lake CG, Pine Valley Rec Area, Pine Lake CG, & Blue Spruce CG. In 2018 we had 4 water systems surveyed by the state of Utah. They completed the sanitary survey for the following areas: Deer Haven CG, Tropic Springs Road Side Stop, Panguitch Lake CG, & Kings Creek CG. All drinking water sources were sampled monthly in 2017 and 2018. All nitrate and sulfate monitoring completed returned acceptable results. In the event that coliform test results exceeded the allowable maximum contaminant level follow up testing was completed, and satisfactory results were obtained. Therefore, water quality testing shows that drinking water is safe.as water systems continue to meet federal, state, local requirements.

**4. *Do dams on Forest Service lands meet State and Local safety requirements?***

The following dams were also surveyed by the State of Utah in 2017 and 2018: Panguitch Lake, Pine Valley, Pine Lake, Posey Lake, Topic Res., Red Creek, Yankee, Duck Creek, Aspen Lake, Enterprise Upper and Lower, Grass Valley. Grass Valley failed due to an intake error. Forest-owned dams (Flat, Robs, Posey, and Pine Creek) continue to be under-funded, and in need of heavy maintenance and/or reconstruction. The Navajo Lake Dam is operated under a shared maintenance agreement between the Forest Service and the State of Utah. It failed twice in the past 10 years. The State of Utah is working on plans to reconstruct the dike and the Forest Service is working on the environmental study required to reconstruct it. In FY19 Pine Valley dam will be getting repairs done to it. The dam will be getting a Toe Drainage System. Dams are being inspected at required intervals and critical safety items are being addressed.

## **Adaptive Management Considerations**

No adaptive management considerations are being recommended at this time.

## **Monitoring Item 8 Protection**

Fire is a key ecological disturbance agent on the Dixie and is extremely important to manage both for the health and resilience of the landscape as well as for the sustainability of communities adjacent to the forest. Maintaining fuels conditions at levels that minimize unwanted effects to the ecosystem and reduce risk to people, communities and supporting uses of the forest is of critical importance.

Therefore activities that affect fuels conditions and levels are important to monitor for how they modify the start and spread of wildfires that could affect these critical resources. Likewise, monitoring for how fires start and are managed is important for understanding how we are doing at minimizing

the impacts from unwanted wildfires while using natural fires when and where it is appropriate on the forest.

**Table 11 - Summary of Monitoring Question and Indicator(s)**

Monitoring Question	Monitoring Indicator(s)
Are fuel treatment projects reducing risk to property, human health and safety, and reducing the potential for unwanted fire effects through reduction of total fuel loading to manageable levels?	Percent of projects where post-treatment total fuel load is reduced from pre-treatment levels.
Are forest vegetation conditions trending towards safe and efficient fire response and restoring fire as a disturbance agent consistent with management area emphasis and historic fire return intervals?	Percent of fires suppressed during initial attack where that is the chosen strategy.  Percent of natural ignition acres with resource benefit.
Are forest vegetation conditions stable or moving toward Forest Plan desired conditions?	Extent of insect and disease infestations.

## New Science or Other Information

No new science or information collected outside of this monitoring program was considered in the evaluation of this monitoring item.

## Monitoring Discussion and Findings

- Are fuel treatment projects reducing risk to property, human health and safety, and reducing the potential for unwanted fire effects through reduction of total fuel loading to manageable levels?*

The Dixie National Forest used prescribed fire and mechanical treatment activities, to mitigate accumulations of natural and/or activity generated fuels that exceeded the objective fuel loading across the forest. Fuel treatment effectiveness was monitored across the Forest by establishing and re-measuring sampling locations for both fuels treatments and wildfires. This involved data gathered from over 100 plots annually across the Forest.

In 2017, the Forest fuels program completed a total of 5,463 acres of treatments, including 2,688 acres of prescribed fire treatments and 2,775 acres of mechanical treatments in 14 projects.

In 2018, the Forest fuels program completed a total of 10,637 acres of treatments, including 2,910 acres of prescribed fire treatments and 7,727 acres of mechanical treatments in 18 projects.

In general the desired results and trajectory are being achieved. Vegetation treatments that manipulate fuel loading levels to more desirable levels are shown to reduce risk to values and create a safer environment for firefighters. A number of areas on the forest have had wildfires burn into fuels treatments or past wildfires and a significant decrease in fire behavior was



experienced allowing firefighters an opportunity to effectively stop progression and/or fire effects were less impactful on the land. An increase in the number of acres treated across the forest in high risk areas is trending more areas of the forest towards desired conditions for the future.

In areas where wildfires are able to be managed to meet resource objectives, the forest is seeing success through larger areas being treated and a trend towards more natural fire on the landscape. Recent wildfires that were managed in fire dependent systems were beneficial and met the objective of restoring fire to the ecosystem. Success is being seen in the ability to more efficiently manage wildfires from both areas that previous wildfires with beneficial outcomes in treating vegetation has occurred to areas where fuels treatments have effectively reduced fuels to make wildfires more manageable.

**2. *Are forest vegetation conditions trending towards safe and efficient fire response and restoring fire as a disturbance agent consistent with management area emphasis and historic fire return intervals?***

In 2017, a total of 64,182 Dixie National Forest acres were burned, well above the five-year average of 2,710 acres. There were 39 wildfires on the Forest, with the majority of the acreage burned occurring on the Cedar City Ranger District. 27 of the fires were lightning caused burning only 7 acres, the remainder being human caused. No fires were managed for resource objectives in 2017. The Forest had a 95% success rate for initial attack on fires where full suppression was the chosen management strategy.

The Pine Valley Ranger District had the first large fire of the season. The North fire started by arcing powerlines during a strong storm on June 9 and grew to 492 acres before being contained. This fire was in an area that is prone to cheat grass invasion post-fire so a full suppression strategy was employed. The Cedar City Ranger District had the largest fire of 2017, the Brianhead fire, which started on private lands on June 17<sup>th</sup> and quickly spread to heavy timber fuels that made suppression difficult. By the time it was contained, the fire had burned a total of 71,675 acres, 89% of which were on the Forest. This fire was a full suppression fire due to being human caused and starting on private lands.

In 2018, there was a total of 48 fires on the Dixie National Forest burning 12,802 acres. The majority of the acres were again attributed to a human caused fire occurring on the Pine Valley Ranger District, however on 7 fires were human caused this year. The largest lightning caused fires burned on the Powell Ranger District late in the season and were successfully managed to achieve resource objectives. The Forest had a 98% success rate for initial attack on fires where full suppression was the chosen strategy.

The Pine Valley Ranger District had the largest fire of the season in 2018, with the West Valley fire burning 11,771 acres before containment. This fire started in late June by an escaped campfire in the Pine Valley Wilderness. In late August the Riggs fire started on the Powell Ranger District adjacent to Bryce Canyon National Park. This fire was managed to achieve resource benefits jointly with the Park and BLM and eventually burned a total of 1,387 acres, 559 of which were on the Forest. This fire was joined a couple of weeks later by the Lonely fire that started on the Park and was managed with the Riggs fire. It burned 872 acres, 419 on the Forest, before burning into the Riggs fire

In areas where wildfires are able to be managed to meet resource objectives, the forest is seeing success through larger areas being treated and a trend towards more natural fire on the landscape. Recent wildfires that were managed in fire dependent systems were beneficial and met the objective of restoring fire to the ecosystem. Success is being seen in the ability to



more efficiently manage wildfires from both areas that previous wildfires with beneficial outcomes in treating vegetation has occurred to areas where fuels treatments have effectively reduced fuels to make wildfires more manageable.

**3. *Are forest vegetation conditions stable or moving toward Forest Plan desired conditions?***

This same question and indicator is discussed in Monitoring Item 5 Timber and therefore will not be discussed here.

## Adaptive Management Considerations

No adaptive management considerations are being recommended at this time.

## Monitoring Item 9 Education

Public outreach is the most direct way employees on the Dixie National Forest interact with the public. Outreach events can educate the public on resources offered by the forest and help them feel a sense of ownership to ensure the sustainability of forest resources. Because most events are focused on youth, outreach is critical in remaining relevant as a multiple use forest for the next generation of forest users. Measuring the number of events held and its key messages helps gauge the forest's effectiveness in reaching the public.

**Table 12 - Summary of Monitoring Question and Indicator(s)**

Monitoring Question	Monitoring Indicator(s)
Education and information: Are we delivering key education/enforcement messages to forest employees and users? (Key focus areas are: OHV use, recreation user ethics, fire's role/hazardous fuels, noxious weeds, watershed health.)	Number of key messages.

## New Science or Other Information

No new science or information collected outside of this monitoring program was considered in the evaluation of this monitoring item.

## Monitoring Discussion and Findings

**1. *Are we delivering key education/enforcement messages to forest employees and users?***

Since 2016, reporting of outreach events and number of people at events has been more consistent due to continuity in personnel. The forest has also incorporated public outreach into its priorities and vision of developing stronger partnerships and becoming more involved in local communities. This is in part due to the development of programmatic methodology in

annual reporting in the NICE database and greater focus across the forest on public outreach and education (i.e. development of the Dixie's Conservation Education Plan; incorporated into Dixie forest priorities and vision).

## Adaptive Management Considerations

No adaptive management considerations are being recommended at this time.

## Conclusion

Sound monitoring is fundamental to ensuring actions on the ground are having the intended effects and moving the forest toward a more desired state. This first biennial monitoring report helped identify areas where improvement can be made. As shown in Table 1, Forest Plan monitoring results on the Dixie National Forest demonstrate intended progress or trend toward plan targets for the plan components in 26 of the 38 monitoring questions, and don't demonstrate intended progress or trend toward plan targets for the plan components in 2 of monitoring question; it is uncertain for the remaining component questions. As shown in Table 13. Summary of monitoring evaluation findings for all monitoring questions. Table 13 (with more details given in Table 1 and the Monitoring Evaluation portion of this report) changes to the Forest Plan component, management activity, Plan monitoring program, and/or Forest assessment topic may be warranted for 10 of the 38 monitoring questions and is uncertain for some of the others. Some of those changes for management activities and the plan monitoring program can be incorporated without a new plan monitoring program (e.g. following a process to ensure protective measures analyzed for in NEPA documents are followed, and simply changing some of the monitoring methods in the monitoring plan guide). Additional monitoring and consideration should be given to the other plan components where a change may be warranted.

**Table 13. Summary of monitoring evaluation findings for all monitoring questions.**

Changes may be warranted for the:	Yes	Uncertain
Forest plan (component)	Goshawk territory occupancy at the forest level  Changes in Stream Channels and Riparian Areas Due to Management	TES Sensitive Plant Species  Indicator and Special Status Species  Threatened, Endangered and Sensitive Animal Species  Goshawk territory occupancy following vegetative management treatments  Fish - Quantity and Quality of Aquatic Habitats (Questions 5 and 6)

Management activities (Forest Plan component affected)	<p>Fish – Quantity and Quality of Aquatic Habitats</p> <p>TES Sensitive Plant Species</p> <p>Indicator and Special Status Species</p> <p>Range Condition and Trend</p> <p>Changes in Stream Channels and Riparian Areas</p> <p>BMP effectiveness and compliance on land disturbing projects</p>	<p>Developed Sites Actual Use</p> <p>Threatened, Endangered and Sensitive Animal Species</p> <p>Invasive Species</p>
Plan monitoring program (item and question number)	<p>Recreation and Wilderness question 6</p> <p>Water and Soil questions 2 and 4</p>	
Forest assessment (topic)	<p>Wilderness Character</p> <p>Goshawk territory occupancy at the forest level</p>	

## Appendix A: Monitoring Discussion & Findings and Adaptive Management Findings Work Sheet

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This is the worksheet that was used for each of the monitoring questions in the monitoring plan.

### Monitoring Discussion and Findings

#### Monitoring Program (Questions 1-4)

1. Did the monitoring results provide all the information necessary to answer the monitoring question? **Yes or No?**
2. **If yes**, go on to question 5. (Also, mark in Table 5a in the Adaptive Management Considerations section) that no change would be warranted to the Monitoring Program based on this monitoring question). If no, list the information that was missing, incomplete, or was needed to answer the monitoring question.
3. For those items listed in 2) above, **briefly describe why** the information was missing, incomplete, or otherwise not provided in the monitoring results?
4. Based on the responses to 1), 2), and 3) above, may a change be warranted for the Plan Monitoring Program?

**If change may be warranted**, briefly describe the opportunities for change here, and mark the respective box in Table 6 below.

**If unsure**, briefly discuss why the response was not “change may” or “change is not” warranted, and mark the respective box in Table 6 below.

#### Forest Plan (Questions 5-8)

5. Based on the monitoring results, are the Forest Plan components progressing, trending, or maintaining as desired or anticipated? **Yes or No?**
6. **If yes**, briefly describe the success and go on to question 9. (Also, indicate that no change would be warranted for the Forest Plan based on this monitoring question, see Table 6).  
**If no**, list the monitoring indicators – or other plan components – from the results section that are not progressing, trending, or maintaining as anticipated.
7. For those items listed in 6) above, **briefly describe why** these Forest Plan components may not be progressing, trending, or maintaining as anticipated.
8. Based on the answers to 5), 6), and 7) above, may a change be warranted for the Forest Plan?

**If change may be warranted**, briefly describe the opportunities for change here, and mark the respective box in Table 6 below.

**If unsure**, briefly discuss why the response was not “change may” or “change is not” warranted, and mark the respective box in Table 6 below.

### Management Activities (Questions 9-12)

9. Did any USFS management activities or other events in the plan area positively or negatively influence the monitoring results? **Yes or No?**
10. **If no**, go on to question 14. (Also, indicate that no change would be warranted for Management Activities in the plan area based on this monitoring question, see Table 6).  
**If yes**, list the management activities or other events that may have influenced the monitoring results?
11. For those items listed in 10) above, **briefly describe** how those management activities or other events may have influenced the monitoring results?
12. Based on the response to 9), 10), and 11) above, may change be warranted for management activities in the plan area?  
**If change may be warranted**, briefly describe the opportunities for change here, and mark the respective box in Table 6 below.  
**If unsure**, briefly discuss why the response was not “change may” or “change is not” warranted, and mark the respective box in Table X below.

### Forest Assessment (Questions 13-16)

13. Do the monitoring results show trends or values not anticipated or described in the Forest Plan Assessment? **Yes or No?**
14. **If no**, skip the remaining questions. (Also, indicate that no change would be warranted for Forest Assessment in the plan area based on this monitoring question, see Table x.).  
**If yes**, briefly list the unanticipated or poorly described conditions in the Forest Assessment.
15. For those items listed in 14) above, **briefly describe** what in the Forest Assessment was not anticipated or described in the Forest Assessment?
16. Based on the responses to 13), 14), and 15) above, may a change be warranted for the Forest Assessment?  
**If a change may be warranted**, briefly describe the opportunities for change here, and mark the respective box in Table 6 below.  
**If unsure**, briefly discuss why the response was not “change may” or “change is not” warranted, and mark the respective box in Table 6 below.

If change is not warranted, then the response to 13) above should have been “yes”.

### Adaptive Management Considerations

**Table 14. Summary of where change may be warranted based on monitoring item 1 results**

Changes may be warranted for the:	Yes	Unsure	No
Forest plan			
Management activities			
Plan monitoring program			
Forest assessment			

**Table 15. Monitoring indicator status summary**

Evaluation Report Year	Result*	Recommendation(s) (if applicable)	Recommendation Status
FY18			
FY20			
FY21			

**\*Result: 1)** Interval of data collection beyond this reporting cycle (*indicate date of next time this monitoring item will be evaluated*); **2)** Implementation of Plan Component(s) ARE trending, progressing, and/or conducted as desired; **3)** More time/data are needed to understand status or progress of the Plan Component(s); **4)** Implementation of Plan Component(s) ARE NOT trending, progressing, and/or conducted as desired; **5)** Methods inadequate to answer monitoring question.

## Appendix B: Monitoring Matrix for the Dixie Forest Plan

This table is the entire monitoring plan guide matrix for the Dixie, organized by program area.

Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
Recreation	Developed Sites; Actual Use	Are developed recreation sites meeting Forest Plan standards for use, and are visitors satisfied?	Developed site use and visitor satisfaction.	Annually collect use data from concessionaire. Evaluate satisfaction using the National Visitor Use Monitoring data every five years.	Recreation
	Developed Sites; Condition	Are developed recreation sites meeting Forest Plan standards for condition?	Developed site condition.	Annually condition surveys are performed on 20% of developed sites. All sites are completed within a 5 year period.	Recreation
	Dispersed Sites; Actual Use	Are dispersed recreation sites meeting Forest Plan standards for use, and are visitors satisfied?	Dispersed site use and visitor satisfaction.	Annually use road/trail counters to collect use data. Evaluate satisfaction using the National Visitor Use Monitoring data every five years.	Recreation
	Dispersed Sites; Condition	Are dispersed recreation sites meeting Forest Plan standards	Dispersed site condition.	Collect campsite condition data every 5 years and	Recreation

Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
		for condition, and are visitors satisfied?		compare form condition trends.	
	Trail Condition	Are trails meeting Forest Plan standards for use and condition, and are visitors satisfied?	Trail use, and visitor satisfaction; miles of motorized trail managed to standard; miles of non-motorized trail managed to standard.	<p>Annually collect trail use data using trail counters.</p> <p>Annually collect trail condition data on trails assigned by the Washington Office (Random 2% survey).</p> <p>Evaluate satisfaction using the National Visitor Use Monitoring data every five years.</p>	Recreation
Wilderness	Wilderness Character	Is wilderness character being preserved on wilderness areas across the Forest?	<p>Incursions of developed facilities, access, services and perception of safety.</p> <p>Wilderness campsite condition.</p> <p>Motorized/mechanized incursions.</p>	<p>Annually collect trail use data using trail counters.</p> <p>Collect campsite condition data every 5 years and compare form condition trends.</p> <p>Report the number of motorized/mechanized incursions.</p>	Recreation



Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
			Managed wildland/prescribed fire usage.	Report the number of wildfire starts and report the number of managed and prescribed fires.	
Cultural Resources	Identify, protect, interpret and manage the significant cultural resources on Forest lands.	Are heritage resources being protected and are mitigation measures sufficient to prevent damage to heritage resources from federal actions, looting, environmental disturbance, and other actions?	<p>Number of historic properties recorded and evaluated for the National Register.</p> <p>Number of eligible historic properties being impacted by federal actions, looting, environmental disturbance, and other actions.</p>	<p>Report the number of historic properties recorded and evaluated for the National Register of Historic Places during inventory for proposed undertakings.</p> <p>Revisit Historic Properties after project implementation and other actions on at least 1 projects/activities per year to document effectiveness of protection and mitigation measures.</p>	Forest Archeologist or staff
Fish and Wildlife	Wildlife Habitat Diversity	Is the diversity of wildlife habitat being maintained by managing Vegetative Structural Stage (VSS) distribution across the planning area?	Diversity and stability of forest vegetational structural stages (VSS) at the planning area and landscape level.	Collect VSS data in proposed planning areas and evaluate against desired VSS distributions at the project planning area level. Use of Utah Division of Wildlife Range Trend Data may be	Wildlife Program Manager

Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
				used if available and applicable in combination with VSS data. In addition, old growth evaluation data, visual reconnaissance and GAP data may be used to if applicable.	
	Modification of Ecosystem	Are forest management activities and/or natural events affecting the structure and function of upland and riparian ecosystems?	Structure (VSS) and function of forest and riparian ecosystems.  Upland and riparian vegetation diversity, condition, trend, structure and ground cover.	Monitor ground cover using. Nested Frequency, Ocular Macroplot, Riparian Level III (Greenline), and/or Photopoint methodologies. These monitoring studies are on a 5-10 year rotational visit basis and will be reported annually, by district, after completion.	Wildlife biologist and foresters collecting VSS data.  Vegetation monitoring data collected by forest botanist, fish

Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
					biologist or hydrologist.
	Big Game Habitat Condition	Is big game habitat maintained to meet Forest Plan desired conditions?	Big game habitat condition and/or VSS Distribution across the landscape and within projects.	Collect VSS habitat data and evaluate against Forest Plan guidance under desired conditions for VSS distribution. Use of Utah Division of Wildlife Range Trend Data may be used if available and applicable in combination with VSS data. In addition, old growth evaluation data, visual reconnaissance and GAP data may be used to if applicable.	Wildlife biologist and forester collecting VSS data.
	Fish	Are forest management activities and natural events affecting the ecological conditions indicated by the status of focal species <sup>9</sup> ?	Occupied habitat and population structure of focal species.	Qualitative and quantitative electrofishing surveys in streams and gill net surveys in lakes. Fish bearing streams are visited	Forest Fish Biologist in coordination with Utah Division of

<sup>9</sup> Bonneville Cutthroat trout (BCT), Colorado River Cutthroat Trout (CRCT), Southern Leatherside, Chub, Virgin spinedace and Nonnative trout species.

Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
	Quantity and Quality of Aquatic Habitats	<p>Are management activities maintaining and improving the ability of lakes and streams on the Forest to maintain self-sustaining cold water fisheries?</p> <p>Are forest management activities and/or natural events maintaining aquatic habitat to meet Forest Plan desired conditions and objectives or improving habitat to move toward those conditions and objectives?</p>	<p>Riparian vegetation diversity, condition, trend, structure and ground cover.</p> <p>Stream channel condition, morphology, bank stability and substrate composition.</p>	<p>on a 5-7 year interval; therefore, approximately 20-40% of the Forest's fish bearing streams will be sampled in 2017-2018. At least 1 lake per year will be sampled.</p> <p>Nested Frequency, Ocular Macroplot, Riparian Level III (Greenline), and/or Photopoint methodologies. These monitoring studies are on a 5-10 year rotational visit basis and will be reported annually, by district, after completion.</p> <p>Multiple Indicator Monitoring. Existing sites will be on a 3-5 year rotational visit basis and will be reported annually, by district, after completion.</p> <p>Cooperative grab sampling (10 Samples per</p>	<p>Wildlife Resources Regional personnel.</p> <p>Forest Botanist</p> <p>Forest Fish Biologist and Zone Hydrologists</p>

Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
			<p>Compliance with State water quality sediment, turbidity and temperature standards and maintenance of beneficial uses.</p> <p>Function and condition of lentic riparian areas.</p>	<p>year at 3 sites) for analyses according to state protocols. 15 min to 30 min continuous temp logging on fish bearing streams. At least 10 per year.</p> <p>For all types of activities where wetlands are within the project area at least 2 partial GDE level I surveys annually.</p>	<p>Zone Hydrologists and Forest Fish Biologist</p> <p>Zone Hydrologists</p>
	Threatened, Endangered and Sensitive Plant Species	Are TES plant habitats being protected from forest plan implementation activities and maintaining sufficient numbers and distribution to maintain viable populations across the Forest?	TES species have suitable habitat to sustain population numbers to maintain viability.	TES Plant Studies, Nested Frequency, Ocular Macroplot and/or Photopoint methodologies. Quantitative data on number and trend of representative TES plants within a defined plot or transect area will be collected and reported every two years.	Forest Botanist
	Indicator and Special Status Species	Are forest management activities and natural events affecting the	Habitat conditions retained across the planning area in sufficient numbers and	Review VSS distribution data Review wildlife specialist reports, biological	Wildlife program manager.

Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
		ecological conditions indicated by the status of focal species <sup>10</sup> ?	distribution to maintain species viability.	<p>evaluation/assessment determinations made on current year projects for impacts to species viability.</p> <p>Survey for TES and MIS status species are conducted across the DNF by the Forest level monitoring crew &amp; additional monitoring is conducted by district biologist.</p> <p>Using management indicator species (MIS) as indicators of ecological conditions across the Forest. MIS are monitored at the project level. Effects analysis are conducted at the project level per individual species.</p>	

<sup>10</sup> Mule deer, rocky mountain elk, wild turkey, Northern goshawk, Northern flicker, and sage-grouse, pygmy rabbit, spotted bat, Townsends Wester big-eared bat, bald eagle, sage-grouse, peregrine falcon, Flammulated owl, and three-toed woodpecker.

Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
	Threatened, Endangered and Sensitive Animal Species	Are TES animal habitats being protected from forest plan implementation activities and maintaining sufficient numbers and distribution to maintain viable populations across the Forest?	TES species have suitable habitat to sustain population numbers to maintain viability.	<p>Fish - Qualitative and quantitative electrofishing surveys in streams and gill net surveys in lakes. Native cutthroat streams are visited on a 5-7 year interval as determined by the UDWR. Streams in the Virgin River and Escalante River drainages are scheduled for 2018 sampling. Virgin spinedace and Southern leatherside streams are sampled on a 5-year rotation in coordination with UDWR. At least one stream for these species will be sampled in 2017-2018.</p> <p>Amphibians – Visual Encounter Surveys of known breeding areas at least once annually in 2017-2018.</p>	<p>Forest Fish Biologist in coordination with Utah Division of Wildlife Resources Regional personnel.</p> <p>Forest Fish Biologist in coordination with Utah Division of Wildlife Resources Regional personnel.</p>

Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
	Snag Management	Is the spatial arrangement of snags in condition to meet needs of cavity nesters?	Snag species, density, size, height and condition.	<p>Monitor snag species, size (DBH), density of snags distribution, height and condition during the project level analysis phase and/or at the watershed scale for planning purposes.</p> <p>Common Stand Exam data, which will observe and record stand health, will be collected for each proposed project involving timber stands.</p>	Wildlife biologists and foresters collecting data.
Goshawk	Goshawk territory occupancy at the forest level	Are known goshawk territories on NFS lands remaining occupied?	Goshawk territory occupancy.	Annual nest territory occupancy monitoring across all Ranger Districts.	District wildlife biologist and forest wildlife program manager.



Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
	Goshawk territory occupancy following vegetative management treatments	Are goshawk territories remaining occupied following vegetation management?	Goshawk territory occupancy.	Annual nest territory occupancy monitoring across all Ranger Districts	District wildlife biologist and forest wildlife program manager.
	Dispersion & patch size of mature/old forest groups	Is mature and old forest habitat connectivity being adequately maintained?	Percent and distribution of mature and old forest cover.	<p>Annual mapping of mature/old forest habitat across the Forest in project areas by Ranger District.</p> <p>Common Stand Exam data, which will observe and record stand health, will be collected for each proposed project involving timber stands.</p> <p>Individual project monitoring is conducted on a project and district level. Forest plan requirements for VSS distribution, maintaining groups/clumps, and adhering to Northern goshawk standards is</p>	Wildlife program manager

Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
				required of every vegetation project.	
	Down log & woody debris amounts/sizes within a 10 acre treatment block	Is downed wood being maintained in sufficient amount, size, and location?	Quantity of downed logs and woody debris.	Transects (such as Browns) monitoring down logs and down wood debris.	Wildlife biologists and foresters, and/or fire personnel.
	Ungulate grazing practices in identified at-risk locations	Are appropriate adjustments to grazing practices being made where grazing is contributing to at-risk conditions?	Ungulate grazing practices in at-risk locations.	<p>Identify at-risk locations by Ranger District and monitor use by ungulates and evaluate against desired VSS distributions in Forest Plan.</p> <p>Monitoring of grazing allotments occurs on a rotational schedule across the DNF. Long-term range trend transects are established and monitored on a 5 year rotation. In addition, UDWR has established long term monitoring transects across the DNF in key habitat areas. These</p>	Forest Botanist & Wildlife Program Manager.

Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
				transects are monitored on a 5 year rotation.	
Range	Permitted Animal Unit Months (AUMs)	Are goods and services being provided in accordance with Forest Plan goals and objectives?	Level of permitted livestock grazing.	INFRA Query	Range Program Manager
	Range Condition and Trend	Are desired conditions for rangeland plant communities being met in regards to species composition, trend and ground cover?	Range condition, trend and ground cover.	Nested Frequency, Ocular Macroplot, Riparian Level III (Greenline), and/or Photopoint methodologies. These monitoring studies are on a 5-10 year rotational visit basis and will be reported annually, by district, after completion.	Forest Botanist
	Invasive Species	What is the extent of the change of ecological conditions due to invasive species?	Estimated acres infested with invasive plants and noxious weeds.	TESP/IS Database Query	Range Program Manager
Timber	Assure that vegetation manipulation will not favor an increase in forest pests	Are vegetation conditions stable or moving toward Forest Plan desired conditions?	Extent of insect and disease infestations.	<sup>ii</sup> Common Stand Exam data, which will observe and record stand health, will be collected for each proposed project involving timber stands. Insect and disease flights will be	Timber Program Mgr / Forest Silviculturist through data gathered at

Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
	(insects, diseases, etc.)			conducted annually by FHP and an assessment report will be completed biannually.	the District level by local personnel or by contract.
Water	Water Quality	Are beneficial uses, identified by the state of Utah, being maintained for all water bodies?	<p>Impairment or degradation of water quality.</p> <p>Number of impaired or degraded water bodies.</p>	<p>10 Samples per year at 3 sites cooperative grab sampling for analytes according to state protocols and 30 min continuous temp logging with tidbits at the sites.</p> <p>Annual UDEQ 303(D) List Report.</p>	Zone Hydrologists
	Changes in Stream Channels and Riparian Areas Due to Management	Are forest management activities affecting stream channels and riparian ecosystems?	<p>Riparian ecosystem vegetation diversity, condition, trend, structure and ground cover. Riparian species occupied habitat and population structure. Stream channel condition, morphology, bank stability and substrate composition.</p> <p>Riparian species occupied habitat and population structure.</p>	Riparian Level III (Greenline) methodology monitoring for vegetative successional status and woody species regeneration. These monitoring studies are on a 5-10 year rotational visit basis and will be reported annually, by district, after completion.	<p>Forest Botanist for Vegetative Measures.</p> <p>Zone Hydrologists for Stream Channel measures.</p>

Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
				<p>For non-range related activities Channel Cross Section Analysis and Zig Zag Pebble Count methods for channel condition, morphology, and substrate composition. At least 2 activities monitored annually.</p> <p>For range related activities MIM protocol for streambank stability, channel condition, and substrate composition. At least two pastures monitored annually.</p> <p>For all types of activities where wetlands are within the project area at least 2 partial GDE level I surveys annually.</p>	
	Best Management Practices (BMP) effectiveness	Are appropriate BMPs being followed with forest management activities and are they meeting their intended	BMP compliance and effectiveness	7 Activities Annually Using The National BMP Monitoring Protocol.	Forest Hydrologist/ Soil & Water

Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
	and compliance on land disturbing projects	effectiveness with respect to impacts to riparian ecosystems?			Program Manager
Soils	Accelerated Soil Loss	Are forest management activities impairing soil productivity of the land?	Changes in soil properties (physical, chemical, and/or biological) and ground cover that result in the loss of the inherent ecological capacity or hydrologic function of the soil resource.	Soil erosion, compaction, displacement, puddling, and severely burned measurements using definitions and thresholds defined in FSM 2500 and forest service soil disturbance monitoring protocol. Monitoring Oi and Oe-Oa for minimum of 4 and 2 mm, respectively, using 100 ft transect every 1 foot. At least 2 activities monitored annually.	Forest Hydrologist/ Soil and Water Program Manager
Facilities	Transportation System Management	Is adequate road access and maintenance being provided?	Miles of classified road open for public use.  Number and condition of deficient bridges.	Report on miles of Open Road every 2 years. 3% Random Sample (from WO) of open roads condition survey per year.	GIS/Engineering

Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
				Condition survey on 50% of bridges per year.	
	Road Maintenance	Are open roads maintained to standard?	Miles of road maintained to standard.	Report on miles of road maintained to standard. 3% Random Sample (from WO) of open roads condition survey per year.	Engineering
	Water Systems	Do potable and non-potable water systems meet Federal, State, and Local requirements?	Water quality monitoring results and condition surveys.	Condition survey on 20% per year.	Engineering
	Dams and Water Impoundments	Do dams on Forest Service lands meet State and Local safety requirements?	Critical safety items identified during dam inspections.	Condition of all High Hazard Dams surveyed annually. Condition survey on 20% of all other dams annually.	Engineering
Protection	Fuel Treatment	Are fuel treatment projects reducing risk to property, human health and safety, and reducing the potential for unwanted fire effects through reduction of total fuel loading to manageable levels?	Percent of projects where post-treatment total fuel load is reduced from pre-treatment levels.	Number of vegetation manipulation projects and count of affected acres by project that: maintain, reduce or increase fuel loads from pretreatment levels as identified in Common Stand Exam data, Fire Effects Monitoring Crew data, or other monitoring data	Fire Program Mgr. / Fuels Planner

Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
				compared to desired acres where fuels are maintained or reduced as identified in project decision.	
	Fire Management	Are forest vegetation conditions trending towards safe and efficient fire response and restoring fire as a disturbance agent consistent with management area emphasis and historic fire return intervals?	Percent of fires suppressed during initial attack where that is the chosen strategy.  Percent of natural ignition acres with resource benefit.	Number of fires that escape initial attack compared to number of fires suppressed for protection of values at risk. (full suppression fires)  Number of acres affected by fires managed for resource objectives (fires other than full suppression) compared to total number of acres burned by natural ignitions (lightning fires).	Fire Program Mgr. / Fire Planner
	Insect & Disease	Are forest vegetation conditions stable or moving toward Forest Plan desired conditions?	Extent of insect and disease infestations.	<sup>ii</sup> Common Stand Exam data, which will observe and record stand health, will be collected for each proposed project involving timber stands. Insect and disease flights will be conducted annually by	Timber Program Mgr / Forest Silviculturist through data gathered at the District



Program	Activity	Monitoring Question	Monitoring Indicator	Methods	Person(s) Responsible
				FHP and an assessment report will be completed biannually.	level by local personnel or by contract.
Education	Public Outreach	Education and information: Are we delivering key education/enforcement messages to forest employees and users? (Key focus areas are: OHV use, recreation user ethics, fire's role/hazardous fuels, noxious weeds, watershed health.)	Number of key messages.	Annually generate a report on number of key messages given from the NICE database (can be the number of messages and/or number of people that received the messages)	Public Staff Officer

<sup>i</sup> TES plant habitats are protected from forest plan implementation monitoring on a project-level basis through the on-going required Biological Evaluation and Assessment process during the NEPA project phase. Sufficient numbers and distribution to maintain viability will be addressed by using the monitoring methods listed in the table. Representative TES plant study sites will be chosen for TES plant species that are known to occur on the Dixie National Forest. TES plants are grouped by similar geologic substrates and distributional patterns to link plants with similar habitats and distributions together. This allows for an assessment of similar habitats using a surrogate plant species for others that are logistically unfeasible to collect data on. Distributional TES plant data may be assessed by looking at the number of Nested Frequency plots a TES plant occurs on (if available), or by tracking the number of occurrences of TES plants encountered during the course of regular plant monitoring work.

<sup>ii</sup> These types of monitoring of forest health are done for such insects and diseases as Mountain Pine Beetle, Spruce Beetle, and mistletoe to name a few. This information is used to compare the current forest health conditions to those desired in the Forest Plan. A silvicultural prescription is then written, if needed, to help maintain or improve forest health. "Management direction for the Forest includes an Integrated Pest Management (IPM) program in which all aspects of a pest-host system are studied and weighed to provide the resource manager with information for decision making. Current pest management practices include stand hazard rating [for mistletoe as well as Mountain Pine Beetle] to identify high-risk stands, monitoring insect and disease levels, and control measures such as harvest and thinning to reduce the potential for outbreaks." (Dixie NF Land and Resource Management Plan pg II-57).